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WEALTH, INCOME AND LIVING[1]

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Discussion of this topic apparently recurs with depressions. On December 29, 1922, just ten years ago at the thirty-fifth Annual Meeting of the American Economic Association,[2] David Friday presented a paper on "The Course of Agricultural Income during the Last Twenty-five Years (1897 to 1922)." L. C. Gray presented a paper on "Accumulation of Wealth by Farmers." O. E. Baker and J. D. Black discussed these papers. Some of Dr. Black's remarks at that time are given in a footnote[3] and apply as well to the present paper.

One day earlier the general topic for discussion was "Factors that Should be Considered in Making Wage Determinations." William F. Ogburn's paper on "Standard-of-living Factor in Wages" analysed the position of the common laborer during the depression that was then nearly over.

Practically no attempt was made at that meeting to compare the relative economic position of the farmer with that of other classes of people. Since the meetings in 1922 and up until 1929 there was much talk of both prosperity and farm relief. Many

[1] This paper was read at a joint meeting of the American Farm Economic Association and the American Statistical Association, Cincinnati, Ohio, December 29, 1932.

[2] *The American Economic Review*, supplement, March, 1923, pages 147-184.

[3] "The most obvious comment to make on Dr. Gray's results is that they are after all only averages; and an average figure for the whole United States does not help us very much. . . . What we need to do now is to work out such incomes for our different classes of farmers separately, our cotton farmers in one group, our corn belt farmers in another, etc."

"In saying that comparison of urban and rural incomes by states in most cases in normal times—not just at present—would prove not unfavorable to agriculture, I am presuming two things which I am sure anyone will accept as reasonable: (1) The comparison must be for the same class of workers. There are few farmers who have as great natural ability as the first-rate professional men and the commercial and industrial heads in our cities; but very seldom have they sacrificed the early years of their lives in getting ready to earn an income. The modal group of farm operators hardly reaches in natural ability and training the modal group of skilled trades. (2) The incomes of farmers and city workers must be divided by a relative of the comparative cost of living for the comparable grades of workers in the country and the city. Such a pair of relatives is difficult to make."

people firmly believe that during most of this period agriculture was in a state of continual depression while industry was booming. Since 1929 practically all industries have been depressed and the people engaged in each industry are likely to believe that they and their industry have suffered most. But what are the facts?

The purpose of this paper is to bring together some of the available statistics and estimates so as to indicate the relative economic position of farm operators, wage earners and the great majority of the population before and during this depression.

Obviously the topics—Wealth, Income and Living—are so broad that only a few aspects of each can be presented in one paper. Wealth as measured in monetary units is mainly the capitalized value of present and prospective future incomes, and living is really the spending of incomes. Therefore the question of incomes is the central topic and it will receive major attention.

There are two main aspects of the problem related to incomes: (1) The total amount of economic goods and services, and (2) the distribution of the income among human beings. The distribution of income among the factors of production as rent, interest, wages and profits is an important part of economic theory but is related to *personal* distribution only through ownership of wealth and property rights. The relation of total national income to personal distribution has received very little attention in economic literature and perhaps it can only be determined by social experimentation. Perhaps the only way to get a large total income is by having a very unequal distribution of that income. If that is true perhaps a smaller, more stable total income more equally divided contributes more to general welfare.

In recent years there has been so much talk about agricultural surpluses and overproduction of other commodities that it seems out of place to even consider the total income. Yet it is important to point out that even in 1928 the per capita realized income including imputed income from owned durable consumers' goods was only 749 current dollars or 452, 1913 dollars,[4] or stated as income per person gainfully employed, the income was only 1,920 current dollars or 1,160, 1913 dollars.

Since 1929 the physical volume of industrial production and imports has been cut almost in two. Agricultural production alone has been maintained, and all classes, perhaps including the farmers themselves, can be thankful that agricultural production has not been reduced. Nearly one-fourth of the people nor-

[4] W. I. King, *National Income and Its Purchasing Power*, page 87.

mally gainfully employed are producing nothing. In other words, this country has been rapidly approaching the stage in which the total income may not be sufficient for a subsistence level regardless of how evenly it were distributed through charity and poor relief.

Agricultural Incomes Since 1897

The most comprehensive statistical analysis of incomes made so far is the study made by Willford I. King, *The National Income and its Purchasing Power,* published by the National

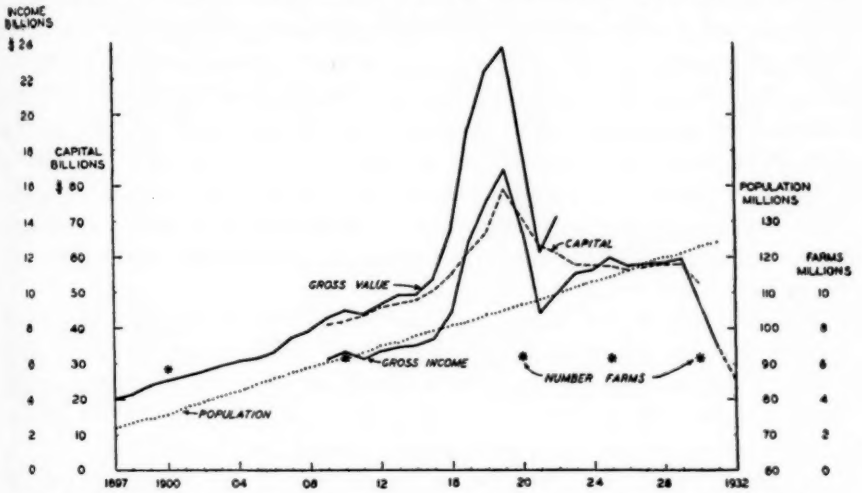

FIGURE 1.—Agricultural Value, Income, Capital, Number of Farms and Total Population

Source of data: Gross value of farm products 1897 to 1922, David Friday, Course of Agricultural Income During the Last Twenty-five Years, *American Economic Review,* March Supplement, 1923, page 153.

Gross Income and Value of Agricultural Capital, U.S.D.A. Bureau of Agricultural Economics, Tentative Estimates of Gross Income from Farm Production, current value of Agricultural Capital and Selected Farm Expenditures, 1909-1931. Mimeographed, July, 1932.

Number of Farms and Total Population from census reports.

Bureau of Economic Research in 1930. This study covers the period 1909 to 1928.

The year 1909 may not be a good starting point for comparing agricultural incomes to the income of other classes. As pointed out by David Friday ten years ago, the period 1909 to 1914 represents the highest point ever reached with the exception of a few war years in relative prices for farm products and income to farmers. E. G. Nourse has said "that it would be little exaggeration to call this period a 'Golden Age' for the farmer."[5]

Figure 1 indicates the relative change in agricultural incomes

[5] *Economic Policy for American Agriculture,* Edward A. Duddy, Editor, University of Chicago Press, 1931, page 20.

from 1897 to 1932. The two series of income data plotted on the graph are not comparable. David Friday estimated gross value of agricultural production while the Bureau of Agricultural Economics estimate is of gross income, a somewhat different and smaller figure. However, since the two series overlap from 1909 to 1922, a fair indication is given of the changes since 1897. For nearly twenty years following 1897, gross value of agricultural products increased at a rate equivalent to population growth. Then the War came along and boosted money values of agricultural products to unprecedented levels. After the War the gross income in current dollars from agricultural products fell back to the same position relative to population as it had maintained before the War. This relationship, whether real or apparent, raises some very complicated problems in economic theory. For example, does value of agricultural products in current dollars bear a definite relation to population growth when in a state of equilibrium? Or are deflated dollars and price ratios a better measure of a socially desirable balance between agriculture and other enterprises?

Since 1929 there has been just as rapid a decline in gross money income from agriculture as there was rapid increase during the War. Is this primarily a result of changes in world trade or is it something more fundamental? The number of farms remained almost stationary throughout the entire period.

A significant change has taken place in the relation of the value placed on agricultural capital to gross income. From 1909 to 1914 capital value was approximately seven times the gross annual income but from 1924 to 1929 it was a little less than five times the gross income. This change is often attributed to a disappearance of expected future increases in land values and lags in adjustment, but there are many reasons for doubting the validity of these explanations.[6]

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[6] The land valuation formula for capitalizing rent and expected increases in rent makes no allowance for changes in the real rate of interest, that is in the purchasing power of interest in goods and services. Moreover, if the formula for capitalizing expected increases in land rents works, then land values should have risen faster than gross income during the war years, but they lagged behind so far that it seems as though current returns were not even capitalized at the previous rate and agricultural capital was less than five times gross income from 1917 to 1920.

Since the pre-war period there has been a significant shift from a more self-sufficing type of agriculture to more commercial production. The greater the amount of commodities used from the farm at farm prices, the higher the real purchasing power of an equivalent money income and consequently the lower the rate of interest used in capitalization of income from durable goods especially land, to obtain value by people buying, selling, or making loans on such property. For example, the purchasing power of 2½ per cent interest used to buy food, feed, and housing at farm prices is equivalent to a 5 per cent rate used to buy the same commodities where prices are twice as high as farm prices. More commercial production and higher standards of living among farmers means that farmers sell more products and repurchase a greater share of their living at higher relative prices. This necessitates a higher rate of return on capital or manifests itself in a higher rate for capitalization

The data shown in Figure 1 have a definite bearing on the welfare of farmers but before farmers can be compared with other classes it is necessary to reduce these figures to a net income per farm family and to obtain comparable figures for other classes. The debatable question of which class or classes are most comparable with farmers at once arises. However, this question can be postponed for a while by dividing society into classes on the basis of incomes and including farmers along with everybody else.

A distribution of income by income classes for each year would be ideal for analyzing the problem, but due to limitations of available data and space, a general average will be shown for the period 1909 to 1928, two classes from 1916 to 1928, and a more detailed distribution for the year 1928. King's data of income to farmers and wage earners from 1909 to 1927 will then be pre-

TABLE 1.—APPROXIMATE NATIONAL MONEY INCOME PER PERSON GAINFULLY EMPLOYED RECEIVING OVER AND UNDER $5000, 1909 TO 1929

Year	Total money income[1] (excluding imputed income) (millions)	Number of people normally gainfully employed[2] (thousands)	Average income	Incomes over $5000			Average income under $5000 of gainfully employed[4]
				Number of returns[3]	Net income reported before income taxes[3] (millions)	Average per return	
1909	$27,661	34,255	$ 808				
1910	29,345	35,100	836				
1911	29,660	35,700	831				
1912	31,755	36,237	876				
1913	33,393	37,028	902				
1914	33,227	37,782	879	208,236			
1915	34,690	37,956	914	208,658			
1916	40,585	38,638	1,050	279,887	$ 5,674	$20,272	$ 910
1917	48,314	39,373	1,227	432,662	7,010	16,202	1,061
1918	56,658	40,383	1,403	478,962	6,530	13,634	1,256
1919	61,628	40,282	1,530	657,659	8,710	13,244	1,335
1920	68,442	40,008	1,711	681,562	8,461	12,414	1,525
1921	58,271	40,819	1,428	525,606	6,362	12,104	1,288
1922	61,187	41,330	1,480	594,211	7,804	13,133	1,310
1923	69,295	42,156	1,644	625,897	8,374	13,379	1,467
1924	71,905	43,123	1,667	697,138	9,751	13,987	1,465
1925	76,561	43,844	1,746	830,670	12,778	15,383	1,483
1926	80,284	44,560	1,802	894,868	13,228	14,782	1,536
1927	82,921	45,373	1,828	913,597	14,064	15,394	1,549
1928	84,119	47,100	1,786	1,010,887	16,956	16,773	1,457
1929				1,032,071	16,696	16,177	

[1] Willford I. King "The National Income and Its Purchasing Power," page 74.
[2] Ibid, page 50.
[3] U. S. Statistics of Income 1929, page 32–33.
[4] Assumes one income tax return represents one gainfully employed. See footnote 7, text.

and a relatively lower capitalized value of land and perhaps all improvements used in agricultural production.

I have not had time to survey all the literature on the subject but have found no analysis of the real rate of interest (corresponding to concept of real wages) as applied to different areas or communities. The real rate of interest, purchasing power of income from land in terms of goods used in living, may account for different land values between areas, countries, and periods of time, and it may also have a fundamental relation to the question of agricultural credit and taxation, especially when taxes are levied as a per cent of capitalized values. Perhaps the nearly self-sufficing farmer when paying 3 per cent on a mortgage equal to 50 per cent of the capitalized value of the farm, is paying just as much in goods as the specialized commercial farmer paying 6 per cent on a correspondingly large mortgage. I should like to see this question discussed more fully by economic theorists.

sented to show trend. Farm incomes during 1924 to 1929 will be estimated from other available data and this period used as a base for showing changes since 1929.

Incomes of Gainfully Employed 1909 to 1928

Table 1 shows the approximate average money income of all persons gainfully employed from 1909 to 1928 and the average money income of groups having money incomes of over and under $5,000 from 1916 to 1928. The term "approximate" is used to cover the technical questions relating to validity of the data.[7] The dividing line was made at $5,000 because of the nature of the data available in Statistics of Income.

The average money income for all persons gainfully employed from 1924 to 1928 inclusive was $1,765, the average for persons gainfully employed with incomes of less than $5,000 was only $1,500, while the average money incomes of those receiving over $5,000 each was $15,000, and during these five years only 1.94 per cent of the gainfully employed were in this higher income

[7] W. I. King's estimates of number of persons gainfully employed and of income excluding imputed income have been accepted as base figures. The imputed income as shown by King was excluded because I had no method of imputing a similar figure to persons filing income tax returns.

One income tax return has been counted as equal to one person gainfully employed. This is not strictly accurate because some persons not gainfully employed file returns, especially some of the wives filing separate returns and also because fiduciary returns do not represent persons gainfully employed. However, the joint returns cover both husband and wife when both are gainfully employed, and in some cases minor children also gainfully employed. It is assumed in this analysis that the income tax returns not representing gainfully employed people equal the number of gainfully employed included in joint returns.

The net income as reported on income tax returns is not exactly comparable to King's estimate of total money income, but no adjustments were made because of the difficulties involved and the tendency for adjustments to cancel each other. Statutory net income is net before income taxes, but after contribution to church and charity, interest and taxes paid, without counting tax-exempt interest, salaries paid by tax supported institutions, other than most of the federal salaries, and in many cases dividends as income. For example, a married state employee with a $6,000 salary and $3,500 income from dividends would not even have to file a return. Subtracting income taxes paid by the persons getting over $5,000 net income and adding tax-exempt interest and salaries would hardly change the total or average income.

I do not know how to handle contributions to church and charity and income belonging to stockholders but not paid out as dividends in order to make the figures comparable to King's. However, I am inclined to believe that if King's figures on total money income are correct, then the derived figures for average incomes under $5,000 are too high because some of the higher incomes now counted as under $5,000 really belong in the over $5,000, and taking incomes above the average out of this lower group reduces the average for those left. Under-statement is due partly to the large number of state and local employees who are exempt from filing unless their other taxable income exceeded $1,500 if single or $3,500 if head of a family. In many cases their taxable and non-taxable income together exceed $5,000. Another reason for under-statement of the number and total incomes of over $5,000 is that Form 1040A used for reporting incomes of not more than $5,000 derived chiefly from salaries and wages does not count dividends as net income. Dividends are reported on the back of the returns. For example, a corporation employee having no allowable deductions to make if receiving a salary of $4,900 and $200 in dividends would file a return showing only $4,900 net income and it would tend to be tabulated as such. Up until 1928 many net incomes mainly from salaries but exceeding $5,000 were incorrectly filed on Form 1040A and therefore not counted as being over $5,000 net income. More complete tabulation in 1928 corrected this error and perhaps accounts for the rise in ratio of number of income tax returns of over $5,000 to number of persons gainfully employed from 2 per cent in 1926 and 1927 to 2.15 per cent in 1928. While the average for everybody gainfully employed fell from $1,828 in 1927 to $1,786 in 1928, the average for those under $5,000 fell from $1,549 to $1,457, a much larger drop due mainly to including .15 per cent more gainfully employed in the over $5,000 group. In this paper I would rather make an error of overstating the average income of everybody receiving less than $5,000 net income than to under-state the income to this group because in comparing the welfare of farmers to this group I do not want to be accused of bias against the farmer.

class. The highest percentage was 2.15 per cent in 1928. This low average income of $1,500 to over 97 per cent of everybody gainfully employed includes income from dividends, interest, wages, salaries, rents, royalties, pensions, etc., and very likely the farm value of products consumed by farmers on the farms.

A comparable distribution of farm incomes above and below $5,000 cannot be made from available data. The distribution of farm incomes published in *Crops and Markets* (September, 1931, pages 403-04) is based on a sample which is not representative of all farms because more of the larger farms make reports. However, since 2.86 per cent of the farms included in this sample had money incomes of $5,000 or over between 1924 and 1928, without placing any value on food, fuel and housing furnished by the farm, one cannot say that a larger percentage of farmers have incomes below $5,000 than of everybody gainfully employed.

The Distribution of Incomes in 1928

A more detailed cross section analysis of income by classes for 1928 is presented in Table 2. About .03 per cent of the gainfully employed representing those with net incomes of over $100,000 cash received more than 5 per cent of the national income, and the 2.15 per cent with incomes of $5,000 and over received 20 per cent. These figures do not include the net income to corporations not paid out as dividends.

It is interesting to note that about 43,000 people receiving net incomes of over $50,000 each, representing a population of 140,000 people,[8] had more net income in 1928 than 6,000,000 farmers, representing a population of nearly 30,000,000, received from farming; that the 382,000 individual income tax returns of net incomes over $10,000 reported more net income than the gross farm value of all agricultural production; and that only a trifle more than 10 per cent of the total population belonged to families or individuals filing income tax returns in 1928.

Since the exemption from filing returns was $3,500 for heads of families, $1,500 for single persons and over $5,000 gross regardless of amount of net income, these income tax data have

[8] "The number of income tax returns have been used to estimate the number of people represented by multiplying the number of joint returns and returns of community property by five, the number of single men and women who are heads of families by 2½ and adding the number of returns filed by single persons. These weights were obtained by multiplying the number of each class or returns by personal exemption allowed, subtracting this from total exemptions as tabulated in the 1928 Statistics of Income, page 6, and dividing the balance by $400, the allowance for each dependent (wives filing separate returns have been omitted from the numbers to avoid duplication), to get the number of dependents. The estimated number of people for each class of income was then expressed as a percentage of the total population of 120,000,000."

TABLE 2.—DISTRIBUTION OF NATIONAL MONEY INCOME AND RECEIPT OF DIVIDENDS BY INCOME CLASSES IN 1928

Net income class	Number of returns filed and gainfully employed	Per cent of gainfully employed	Per cent of 120 million population represented[3]	Money income		Income per return or gainfully employed		Dividends received (millions)	Per cent of net dividends paid by corporations[4]
				Total (millions)	Per cent of total	Big incomes down	Little incomes up		
Income tax returns filed[1]									
Over $5,000,000	26	*	*	$ 253	0.30	$9,731,000	$1,786	$ 67	1.30
Over 1,000,000	511	*	*	1,109	1.32	2,170,000	1,781	316	6.13
Over 500,000	1,494	*	*	1,780	2.12	1,191,000	1,762	513	9.95
Over 100,000	15,977	0.03	0.04	4,451	5.29	279,000	1,748	1,401	27.17
Over 50,000	43,184	0.09	0.12	6,309	7.50	146,000	1,692	2,958	57.36
Over 10,000	382,121	0.81	2.12	12,673	15.06	33,000	1,654	3,496	67.79
Over 5,000	1,010,887	2.15	4.31	16,956	20.16	16,773	1,529	4,010	77.76
Over 4,000	1,499,787	3.18	5.08	19,127	22.74	12,751	1,457		
Over 3,000	2,203,500	4.68	7.35	21,604	25.68	9,804	1,425	{4,203	81.50
Over 2,000	3,041,281	6.46	8.98	23,635	28.10	7,771	1,392	{4,351	84.37
Over 1,000	3,959,728	8.41	10.27	25,162	29.91	6,354	1,373		
Over zero	4,070,851	8.64	10.51	25,226	29.99	6,197	1,367		
Deficit and over	4,143,670	8.80	?	24,727	29.40	5,967	1,369	4,440	86.10
Gainfully employed not filing[2]	42,956,330	9.20	89.49	59,392	70.60	1,786	1,383	717	13.90
Total	47,100,000	100.00	100.00	84,119	100.00	1,786		5,157	100.00

* Less than 0.01 per cent.
[1] U.S. Statistics of Income for 1928, pages 11–12, 24, 76–77, 89.
[2] See Table I.
[3] Calculated from U.S. Statistics of Income for 1928, pages 6, 82–84. See footnote 7, text.
[4] See text and Table III.

little significance for net incomes of less than $4,000. Only 5 per cent of the population lives from incomes above this amount.

The average income per person gainfully employed for the other 95 per cent of the population, as obtained by subtracting income reported on tax returns from the estimated national income, was only about $1,425 in 1928. As the incomes decrease towards zero the number of recipients increase. Unfortunately, there are no good statistics for the distribution of incomes under $4,000. One estimate places the distribution of *family* incomes (not gainfully employed persons) as ⅓ under $1,200, ⅓ between $1,200 and $2,000 and the other ⅓ over $2,000.[9] The significant fact is that a great majority of American people were not receiving as large money incomes in 1928 as is often believed.

If the dividing line between small incomes and large incomes is made at $4,000 or $5,000 or $10,000 then 5 or 4 or 2 per cent of the total population is included in the higher income class. This small percentage of the population receives a considerable portion of its income from the ownership of intangible property and, therefore, is not comparable to either farmers or the great mass of common people who live on small incomes and work for what they get. Dividends received are equal to approximately one-fourth of the total net incomes above $5,000. An analysis of income from other intangible property could be made from the data in Statistics of Income but this would not prove the relative importance of such forms of wealth because it can easily be argued that most of the big corporation salaries go to the owners of stock or their friends and for this reason are also connected with the ownership of intangible property. The ownership of corporation stock represents such an important form of income that it cannot be ignored in a paper dealing with Wealth, Income and Living.

The Ownership of Corporations

The concentration of wealth is perhaps much greater than the concentration of incomes. The ownership of corporations is one of the most important forms of wealth because such ownership controls a large part of the total production of the country, distributes most of the wages, interest and profits, and greatly influences the total amount of savings.

Since corporations own a large part[10] of each other's outstand-

[9] Wood, Edith Elmer, *Recent Trend in American Housing*, New York, Macmillan Co., 1931, page 52.

[10] Data in Statistics of Incomes show that the total dividends received by corporations calculated as a percentage of all cash dividends paid ranged from 20.9 per cent in 1923 to 31 per cent in 1929.

ing stock, final ownership and control rests with the group of people who own the stock not held by corporations. The total dividends paid by corporations filing income tax returns less the dividends received by them equal the net dividends paid to individuals and non-taxable corporations, cooperative societies, mutual savings banks and educational institutions. Dividends received by individuals as reported on income tax returns when expressed as a percentage of net dividends paid by corporations indicate the per cent of corporations owned by the people filing these returns. These statistics are shown in Table 3. From 1922

TABLE 3.—DIVIDENDS PAID AND RECEIVED AND NET INCOME RETAINED 1916–29

Year	Incomes over $5000		Corporations	
	Dividends received[1] (Millions)	Per cent of net dividends received	Net dividends paid[2] (Millions)	Net income retained[2] (Millions)
1916	$2,098	83.92	$2,500	$5,039
1917	2,648	87.54	3,025	4,857
1918	2,133	81.41	2,620	2,079
1919	2,128	81.85	2,600	4,504
1920	2,364	81.52	2,900	1,645
1921	1,915	72.81	2,630	−2,382
1922	2,173	82.50	2,634	2,009
1923	2,443	74.05	3,299	2,825
1924	2,618	76.48	3,423	1,900
1925	3,045	75.86	4,014	3,307
1926	3,581	80.67	4,439	2,736
1927	3,762	78.93	4,766	1,569
1928	4,010	77.76	5,157	2,996
1929	4,247	73.69	5,763	2,908
Total				35,992

[1] Harvard Economic Society, Inc., "The Review of Economic Statistics," May, 1930, page 61 (for years 1916–27); U. S. Statistics of Income for 1928, page 89; ibid 1929, page 76.
[2] Harvard Economic Society, Inc., "The Review of Economic Statistics," November, 1929, pages 180–1 (for years 1916–27); U. S. Statistics of Income for 1928, pages 25, 318; ibid. 1929, pages 18, 267–8.

to 1928 persons filing income tax returns of over $5,000 net income received on the average 78 per cent of the net dividends paid. The estimated figures for years prior to 1922 may be too high on account of changes in laws regarding dividends paid in stock and received from personal service corporations.

The more detailed analysis in Table 2 for 1928 shows that less than .12 per cent of the population received over 57 per cent of the net dividends paid. In that year, for the first time a tabulation was made and published in Statistics of Income to show the number of the returns of net income over $5,000 that reported incomes from dividends. Of the 1,010,887 returns showing net incomes of over $5,000 each, only 569,173, or a little over half, had any income from dividends. The rest apparently did not own any corporation stock. A separate tabulation of the returns of net

income under $5,000 filed on "form 1040"[11] shows that another 222,406 returns reported 3.74 per cent of net dividends. Incidentally, 48 of these returns had incomes of over $50,000 each from dividends alone but they lost it on other activities. The sum of the above figures based on actual tabulations shows that 791,575 persons virtually owned 81.5 per cent of the corporations in 1928, which leaves only 18.5 per cent to be divided among all other owners.

But since people that filed income tax returns of less than $5,000 on form 1040A reported 4.6 per cent of the net dividends paid by corporations, only 13.9 per cent of the stock and very likely no majority control was owned by all the people not filing income tax returns, the non-taxable corporations and, perhaps I should say, foreign investors. Of course the public may be holding a lot of worthless, non-dividend paying stock. Yet it is quite evident that a very small percentage of the people benefits from exempting corporations' dividends from normal income taxes.

Another important feature of corporation income and ownership applies to the accumulation or savings of net income earned but not distributed as dividends during the year or years when it was earned. The figures for income retained as shown in Table 3 are for all corporations, net incomes of some less deficits of others after allowance for depletion and depreciation. Accumulations were made in each year except 1921 when dividends exceeded net income.

From 1916 to the end of 1929 the corporations of this country retained about $36,000,000,000 of net income not paid out as dividends. An average of 2½ billion dollars of purchasing power per year was kept out of the hands of the consumers and reinvested to turn out future consumers' goods or kept in liquid reserve to pay dividends during depressions like the present one. Most of the dividends actually paid out also went to people who had other incomes so large that they did not spend all of their incomes on consumers' goods but reinvested it in more capital to turn out future consumers' goods or loaned it to foreign and domestic consumers.

Corporation ownership through bonds and mortgages cannot be analysed in as great detail but the data in Statistics of Income

[11] Form 1040 is used in filing returns of net incomes over $5,000 and for gross incomes of over $5,000 regardless of amount of net incomes. Therefore, some of these returns show net incomes of less than $5,000 and some deficits. Returns filed on Form 1040A for net incomes of not more than $5,000 derived chiefly from salaries and wages, were not tabulated to show the number receiving dividends, but the total amount of dividends was tabulated in 1928, and has been estimated from a sample in other years.

for 1928 on interest paid and interest received show that corporations paid out $4,581,000,000 in interest, while they received $4,476,000,000 in taxable interest and $593,000,000 of tax exempt interest so that corporations received more interest than they paid out. In other words, the interholding of interest-bearing securities practically cancels and the stockholders virtually own the corporations outright. In this same year individual income tax returns of over $5,000 net income reported taxable interest of $2,144,000,000 and wholly and partially tax exempt interest of $268,000,000.

Most of the above figures on corporation ownership have little or no direct value for comparison with statistics relating to farm incomes, but nevertheless they help to explain why the people in the higher income classes should be excluded when farmers are compared with other classes. These figures also have an important bearing on the causes of depressions, the changes in exports, farm incomes, farm prices, unemployment, and all of the other economic conditions prevailing in this country.

Income to Farm Operators and Industrial Wages, 1909-1927

King's estimates, without any adjustments or changes, of income per farmer and average wages in all industries for people normally gainfully employed, are shown in Figure 2 in terms of 1913 dollars. This figure indicates that farmers as a class were not in an "inferior economic position" relative to wage earners in all industries from 1909 to 1927.

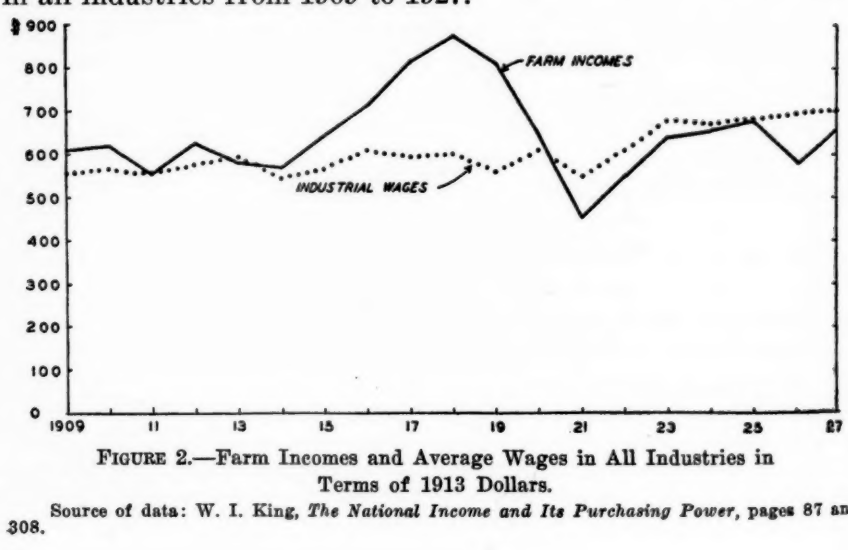

FIGURE 2.—Farm Incomes and Average Wages in All Industries in Terms of 1913 Dollars.

Source of data: W. I. King, *The National Income and Its Purchasing Power*, pages 87 and 308.

Such a conclusion does not seem to harmonize with some frequently accepted ideas about the effect of tariffs and may seem entirely out of line with conclusions based on index numbers of costs, or of prices, price ratios and the purchasing power of the farmers' dollar, especially for the period since the War. Therefore other data will be used to show the economic position of the farmers between 1923 and 1929 and what has happened to incomes since 1929.

Bases for Comparing Farmers' Living With That of Other Classes

In the last analysis, real income above the bare biological necessities of life is psychic and cannot be measured statistically. A person may have plenty of this world's physical goods and yet be very unhappy because his neighbor has more than he has. The habits, customs, traditions, etc., of each community are important factors in determining real incomes. For two groups as unlike as farmers and city dwellers there are many intangible things that cannot be compared. Among these may be mentioned independence, security, fresh air, social and distance isolation, family life and noise. No attempt will be made to compare such items of real income.

Among the tangible items that can be counted or observed as concrete physical phenomena there are many things that have different and varying effects on real psychic income. Running water, indoor toilets and sewer systems are conveniences in most any home. In cities such things are almost absolute necessities, if not to the individual then to the health of the community. On farms they are not essential and the fear of having the water shut off at the curb never troubles the farmer. Sidewalks, paved streets, street lights, etc., are almost necessities in the cities and the value of these things to city people or even rural people, when they shop in town, cannot be easily measured. Police protection is quite essential in many cities and would be very convenient for many farmers raising poultry. The difficulty of interpreting statistics of numbers and guesses as to kind and quality of different items entering into real living on farms and in cities is so great that only four items can be considered here: A house as a house, food as food, fuel as fuel, and money available for other things. In this respect it is not real income but biologically necessary income plus money income that will be compared. However, food, housing and fuel are the major constituents of cost

of living in the cities. Even the items housing, food and fuel are variables and most of the farmers and city dwellers rent or build better homes, heat them differently, and eat higher quality and more varieties of food when they can afford it.

Comparisons could be made in either of two ways: One, by attempting to estimate the city value of housing and products furnished by the farm towards farm family living which will be followed here; the other, by taking some base figure as representing gross money incomes in the city and subtracting from it the cost of housing, city retail prices for the equivalent amount of food and fuel furnished by the farm, street car fares, and any other non-living expenses incurred by the city dweller in obtaining an income, and then comparing the amount of money he has left to spend for other things with the actual money income of the farmers.

The City Value of Housing, Food and Fuel Furnished by the Average Farm

Practically no farm homes are rented just as homes and even though 42.4 per cent of all farms are rented, there is no system for properly allocating a part of the total rent for the farm to the house as a dwelling. The farm is a unit which is both a place to live and a place to make a living. Most studies of farm family living value the house at some arbitrary figure which means little or nothing for comparison especially with cities where a lot on which to build a house often costs as much as a small farm. Perhaps the easiest way in which to approximate an equivalent city value for farm homes is to apply some form of an average of rents paid by non-farm families. The census release of October 15, 1932 on "non-farm families by value or monthly rental of home" lists rents paid by class intervals and gives the median for the whole United States and for each state. Over 53 per cent of non-farm homes are rented and when owned or partly owned the interest and taxes approximate rent on similar property. The modal rent paid by non-farm families fell within the class of $30 to $49 per month and judging from the number in the class below and the class above, it must have been somewhere around $35 per month. The median rent for the whole United States was $27.15 but this is hardly representative of city rents since it includes all rural non-farm homes and very likely all kitchenette apartments and light housekeeping rooms in the cities. The median rents in most of the industrial states also re-

flect rents in small villages and towns of those states but it may be interesting to note that the median rent in New York State was $41.94, in Illinois $39.69, in Michigan $37.79, in New Jersey $37.49, in California $32.73, in Massachusetts $29.70, in Ohio $29.08, in Pennsylvania $26.91, and in the District of Columbia, which comes closest to representing a single city, $44.28.

No matter what form of an average is used, the figures will not mean that the average farm house is worth as much in comparison with a non-farm home but such a figure indicates the amount of rent that the average farmer would have to pay if he moved off the farm.

If farmers are to be compared with everybody else, then it seems advisable to use modal non-farm rents as most representative—this places the city equivalent of annual value of the farm home as 12 × $35 = $420 per year. The median of $27.15 per month or $325 per year may be more appropriate for comparison of farmers with people in the smaller cities, towns and villages. The census figures apparently apply to the spring of 1930 after rents came down a little on account of this last depression. However, city rents have been decreasing since 1924 and therefore either the median or the mode for 1930 understates the average city rents paid during the period 1924 to 1929. Almost everybody knows that the places renting as low as $27 per month before this depression had only a few of the modern conveniences and in most cases lacked the ancient convenience of having a small yard.

The Bureau of Agricultural Economics revised its estimates of gross income in 1930. The new series showing total value of food and fuel used on farms has only been published for each year back to 1924. From 1924 to 1929 these estimates of total value of products retained for consumption on farms divided by number of farms, allow an average of $280 for food and fuel products at farm prices. Perhaps this total figure was derived from the sample of farm records which shows a corresponding average of $271 at farm prices for food alone. However, these figures are considerably lower than the amounts indicated by studies of farm family living, some of which were made by using farm sale prices, others by using local purchase prices. The question is: How much would this food and fuel cost other than farm people at retail prices? Two methods of making approximations from available data are attempted, one of converting estimates in Crops and Markets directly into retail values, and the

other by working through the data published in bulletins on farm family living.

The relative spread between farm prices and city retail prices changes as retail prices rise or fall because many of the intervening costs tend to be on a per unit basis and not as a percentage of value. But regardless of how low the farm prices fall the real income from the goods consumed on the farms remains the same unless the quantity changes. For the United States as a whole during 1924 to 1929 it seems a conservative estimate to place retail prices at twice farm prices. Estimated farm prices as published in Crops and Markets compared with estimated retail prices as published by the Bureau of Labor Statistics for such important commodities as milk and potatoes indicate that retail prices of milk average about two and one-third times higher and potatoes about two and one-fourth times higher than farm prices. For many fruits and vegetables the spread may be much greater but for such commodities as butter, eggs and chickens, the spread is usually less.

A comparison of farm prices in Ohio with retail prices in Columbus, Ohio, showed that farm prices of products used on the farm amounted to 61 per cent of the retail price.[12] A higher than average relationship between farm prices and retail prices would be expected in a state like Ohio. This same study also estimated that farm houses in Ohio would have to be valued at $50 per month rent, or $600 per year to correspond to rents in Columbus.

Doubling the $280 average estimated farm value of products consumed on farms for the period 1924 to 1929 to approximate retail values indicates that this part of farmers' real income would cost $560 in the cities.

Two recent studies, one of farm family living in Iowa[13] covering a three-year period from the fall of 1926 and one of Standards of Living of Employees of the Ford Motor Company in Detroit[14] covering the full year of 1929 can be used for indicating the relative spread between prices of farm products when purchased in the neighborhood and when purchased in city retail stores. The comparable items cost one-third[15] more in Detroit than the value placed on them in the Iowa study.

The Iowa study valued products consumed on the farm at $400

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[12] C. E. Lively. Family Living Expenditures on Ohio Farms. Bull. 465, November, 1930.
[13] Elizabeth E. Hoyt, Value of Family Living on Iowa Farms. Bull. 281, June, 1931.
[14] *Monthly Labor Review*, Bureau of Labor Statistics, June, 1930.
[15] The approximate corresponding prices in cents per pound were: Meat on Iowa farms, 15 cents, retail in Detroit, 31 cents; eggs, 23 cents and 30 cents; milk, 4.7 cents and 6.3 cents; cream, 18 cents and 30 cents; potatoes, 1.5 cents and 2.5 cents. But cheese also purchased by the farmers was 33 cents in both places.

for food and $26 for fuel. One would expect a small amount of fuel to be furnished by the farm where trees are scarce and cobs have little sale value. The value of food furnished by the farm in an area where agriculture is quite highly commercialized would likewise be expected to be smaller than the average for all farms.

The Farmers' Standard of Living, U.S.D.A. Bulletin 1466 by E. L. Kirkpatrick, covers 2,886 white farm families in 11 states and is the most comprehensive sample for analysis of farm family living published to date. Unfortunately, it applies to the period 1922-24 and does not state clearly the method of valuing products used on the farm, but apparently the prices are no higher than purchase prices in neighborhood stores. Incidentally, the amounts spent by these farmers for commodities purchased at retail have been used as weights in constructing the Department of Agriculture's index number of prices paid by farmers for commodities used in living.

This study showed that the average farm furnished $440.70 worth of food and $42.40 worth of fuel at the values placed on these commodities. These farmers also purchased at retail prices $218 worth of food and $42 worth of fuel. On the assumption that the city retail value of food and fuel furnished by farms is approximately one-third higher than the local values used in this bulletin the $483 for food and fuel would cost $644 in the city. The $260 worth of food and fuel purchased by the farmer may cost him more than the city retail prices of the same goods. If local retail prices were one-third higher than city retail prices then these goods would cost $195 in the city. On this basis the city equivalent value of all food and fuel consumed on farms amounts to $840, which one must admit is more than the average laboring man's family in the city can afford to spend for food and fuel.

Subtracting the $260 paid by farmers for food and fuel from $840 leaves $580 as the average city equivalent value for food and fuel furnished by the farm or only $20 more than the estimated value obtained by doubling the farm sales price values from estimates published in Crops and Markets. However, if the total value of food and fuel used on all farms is divided by the number of farm families instead of the number of farms, then the two estimates are almost identical.

The farm value of $483 for food and fuel furnished by the farm can be considered as a sort of minimum city equivalent value which may be appropriate for comparing farmers to dwellers in smaller cities or towns between 1922 and 1929, while $580 as the

city value of food and fuel furnished by farms may be more representative of the cost to a farmer of the corresponding items had he lived in one of the larger cities.

Money Income to Farmers

Farmers receive money income from the sale of crop and livestock products and from other miscellaneous sources. Each year the Department of Agriculture publishes estimates of net income from farm operations. The method of calculation attempts to separate the farm business from family living and excludes the

TABLE 4.—INCOME PER FARM FROM FARMING

Year	Income as published in Crops and Markets[1]	Included farm value of food and fuel[2]	Approximate net cash income
1924	862	266	596
1925	903	296	607
1926	874	287	587
1927	880	276	604
1928	866	276	590
1929	887	283	604
1930	598	243	355
1931	342[3]	162[4]	180[4]
1932	170[4]	120[4]	50[4]

[1] Crops and Markets September, 1931, page 398, table 6.
[2] Calculated from ibid., table 2.
[3] Mimeograph release, Income from Farm Production for 1932, November 19, 1932.
[4] Estimates based on changes of prices and costs as shown in current index numbers and a gross income of $5,240,000,000 for 1932.

taxes, interest, and depreciation of the house or dwelling from expenses but includes as an operating expense room, board and other items furnished farm laborers which are not paid for in cash. On the other hand, the farm sale value of food and fuel furnished by the farm is included as income. The first approximation of estimating net cash money income from farm operations available for family living from these data consists of subtracting the imputed value of food and fuel as shown in Table 4.

A second approximation for the year 1929 can be made by increasing the expenses shown in Crops and Markets to $219,000,000 for repair and depreciation of the dwelling (this allows $50 per farm on all farms not rented from non-operators) and $108,000,000 for taxes and interest on dwelling, and subtracting $276,000,000 as the difference between the census figure of wages actually paid in cash and value of labor charged against farm operations. The sum of these items amounts to a net decrease of $51,000,000 from the net total for this year of $5,579,000,000 as shown in Crops and Markets. Subtracting also the $1,777,000,000 of farm value of food and fuel consumed leaves an approximate total net cash income of $3,751,000,000 which,

of course, is not strictly cash as it allows for depreciation charges which may not be provided for in some years. The family also has some advantage in owning a car since 40 per cent of automobile costs have been charged as a farm expense. If the above total net income is divided by 6,290,000 as the number of farms, the average is $580. But since the census number of farms includes many idle and abnormal farms which do not represent farm families, this amount does not represent farm family income. If 6,080,000, the number of farm operators and managers reported in the census of occupations, is used as the divisor, then the average is $617 per farm family. However, since this is only $13 more than the $604 for 1929, as shown in Table 4, no adjustments will be made in the data presented in Table 4 which indicate that the average annual cash income from farm operations was $600 during the period 1924 to 1929.

It is very difficult to arrive at an estimate of cash income to farmers from other sources than farming. The study of Family Living Expenditures on Ohio Farms[16] based on records kept by 117 families during 1926-7-8 indicates that 16 per cent of total cash income, or $450 came from such sources as labor, road work, hauling, driving school bus, personal service, jury service, paid officership, rents, investments, timber and minerals sold, boarders, gifts, etc. A study of 203 farm families in Kentucky[17] showed average cash incomes from work off the farm and other sources for 1927 of $289. Records from typical upland farms in Arkansas[18] show cash incomes primarily from man and team work off farms of $126 in 1924, $71 in 1925, and $59 in 1926. The bulletin by the United States Department of Agriculture on farmers' standards of living does not state the average amounts but gives a frequency distribution which indicates an average income of $330 from sources other than farm operations.

Perhaps the most significant study now available is that of Part Time Farming in Massachusetts[19] during 1928 because it furnishes some basis for interpreting the census data on part-time farms. The part-time farms studied showed an average cash income of $1,375 from non-farming operations, however, 41 out of the 199 farms, or 20 per cent had a value of farm products in excess of $750 and therefore would not come within the census definition of part-time farms.

Of the 6,288,648 farms listed in the 1930 census, the following

[16] C. E. Lively, Ohio Exp. Sta. Bulletin 468, November, 1930.
[17] Kentucky Exp. Station Bulletin 305, May 1930, W. D. Nicholls and H. W. Hawthorne.
[18] J. H. Decky, Three Years' Study of Farm Management and Incomes in Typical Upland Sections of Arkansas. Bulletin 262, May, 1931.
[19] David Rozman, Massachusetts Agri. Exp. Sta. Bulletin 266, October, 1930.

types are of considerable importance in estimating income from other sources: 498,019 self-sufficing farms; 5,806 institutions and estates; 339,207 part-time farms; 6,201 boarding and lodging houses; 20,106 forest product; and 12,772 horse farms, feed lot, or livestock dealers. In addition 288,766 farms were unclassified because the farms were idle in 1929 or reports were too incomplete for classification. This makes a total of 1,170,877 farms which by census definition were not typical farms, although the census omits the first and last groups from its subtotal of 384,207 abnormal farms.

The studies named above and the census data provide a rough basis for estimating other income. The census value of farm products produced on abnormal farms in 1929 was $412,191,505 and since by definitions other income in most cases was never less than 50 per cent of total income, the other income must have been greater than $412,000,000. If it is assumed that on the average other income was about 60 per cent of the total income then it would amount to $600,000,000, or roughly, $500 each for all abnormal, self-sufficing and unclassified farms. But these census figures by definition indicate only that portion of income from labor off farm, from boarders and lodgers, and from the sale of special products. They have no reference to income from investments, insurance, pensions, gifts, etc. In 1922 L. C. Gray estimated the income from "outside forms of property" as $20 per farm family. If the income from investments, etc., to the owners of estates listed as farms in the census were included as income to farmers, then the average per farm might be very large. However, most farm families not included in abnormal types listed by the census have some income from sources other than farming and it seems fairly conservative to estimate this at about $50 per farm which when combined with the $500 average for abnormal farms, makes an average of $140 for all farm families during 1924 to 1929.

Comparison of Farm Family Incomes with Incomes of Other Classes,[20] 1924 to 1929

The preceding estimates indicate that the average farm family during the period 1924 to 1929 had an average cash income from

[20] These averages for the whole United States tend to understate the economic position of the farmer in the North and West relative to industrial employees in the same areas and to overstate the relative economic position of farmers to laborers in the South. Only about 17 per cent of the industrial employees are in the South (Texas to Maryland) where wages were lower. Census figures for 1929 show that 51 per cent of all farms, 53 per cent of the farm population, and only 25 per cent of farm values were in the South. Data in crops and markets also indicate that the South in 1929 received only 32 per cent of the gross income and 29 per cent of the cash income.

farm operations of approximately $600, other cash income approximating $140. If the farmer had not lived on a farm, house rent would have cost him between $325 and $420 annually and the amount of food and fuel furnished by the farm, between $485 and $580. This is equivalent to a total money income of $1,550 in smaller cities and towns and of $1,740 in larger cities.

The data presented earlier for income classes were not on a family basis but on a per person gainfully employed basis. The same is true of other data available for comparison. Besides, the above figures for farm families are not exactly comparable to

TABLE 5.—AVERAGE INCOMES 1924 TO 1929

Farm families	
Money income from farming $600, other $140 Cost value to non-farm families of Rent—median $325, mode $420 Farm food and fuel $485 to $580 [1]	$1,550 to 1,740
Non-farm families dependent on one bread winner	
Wages of all normally employed wage earners [2]	1,185
Wages of all employed factory laborers [3]	1,295
Salaries of federal, state and local employees [2]	1,645
Salaries of all salaried employees [2]	1,990
Persons gainfully employed (including farmers) [4]	
Money incomes from all sources $1,765 Value owned homes, automobiles, etc. 120 [5]	1,885
2% receiving $5,000 or more money income each [6]	15,000
98% receiving less than $5,000 money income each [6]	$1,500

[1] As explained in text.
[2] 1924–27, King's National Income and Purchasing Power.
[3] From figures in Crops and Markets based on census of manufacture.
[4] See comments by J. D. Black in the *Review of Economic Statistics*, Feb. 15, 1933.
[5] 1924–28, King's National Income and Purchasing Power.
[6] From Table I.

income as estimated by W. I. King. Nevertheless, the data can be used to give a fair indication of the economic position of the farmer relative to other classes, especially the city family dependent on one gainfully employed person for its living.

According to W. I. King's estimates, the average income from 1924 to 1928 of all gainfully employed persons was $1,885 including imputed income and $1,765 excluding imputed income. Other data from King's book on National Income and its Purchasing Power show that the average of all salaries paid from 1924 to 1927 was $1,990. Average salaries of all federal, state, and local governmental employees was $1,645 and average wages of all industries, with allowance for unemployment, was $1,185. Data published in Crops and Markets show that the average factory wages per person employed in 1924 to 1929 was $1,295. The data calculated from King's estimate and from income tax returns showed that the great mass of gainfully employed receiving less than $5,000 each averaged only $1,500. These data are shown in Table 5.

The economic position of the farmer compares very favorably with this average for over 95 per cent of the total population and with most of the above classes during this period when the agricultural industry is supposed to have been in a state of continued depression while other classes enjoyed prosperity. Perhaps the prosperity only accrued to the persons with incomes above $5,000 net who had an average net money income of $15,000 each. Every one will admit that this small class representing less than 5 per cent of the population were in a better economic position than the farmers.

I do not want to leave the impression that farm families enjoyed larger incomes than wage earners who constitute the largest class of city families. City families, on the average, have income from sources other than the salary or wage of one person. In practically one family out of every twelve, both husband and wife are gainfully employed when they can find work but in such cases there usually are no children. The city family also receives some income from other sources such as laundry work, roomers, boarders, paper routes and odd jobs by children, garden plots, in some cases from part-time farming, and from pensions, insurance, free medical clinics, etc. Without any basis for estimating the average amount of such other income it is safest to assume that it was just enough to make the average city family income as large as the average farm family income during the period 1924 to 1929.

However, it appears as if the married man, trying to support a family from his income as a wage earner, was in an inferior economic position as compared with the farm operator raising a family on a farm. The statistics of birth rates in urban and rural districts tend to support such conclusions. Undoubtedly the single man in the city had an economic advantage over married men in either the country or the city.

The living of the $7 per day Ford employee in Detroit[21] compared briefly with Iowa farmers may throw some light on the relative well-being of the two classes. The Iowa farmer is perhaps much better off than the average farmer, while the Ford factory employees receive wages much above the average.

Total value of living for the families of Ford employees was $1,720; Iowa farmers, $1,625 at farm values; average size families were 4.5 and 4.8; value of house rent, $389 and $267; number

[21] Sources, bulletins cited above. For a more complete comparison see *Hoard's Dairyman*, July 10, 1932.

of rooms 4.6 and 7.4; value of food, $556 and $641; and calories per adult male unit was 3,236 and 3,615. Only 47 per cent of Ford employees had automobiles to 96 per cent of Iowa farmers; telephones, 5 per cent and 94 per cent; washing machines, 49 per cent and 80 per cent; bathrooms, 52 per cent and 19 per cent; inside water closets, 60 per cent and 19 per cent. The Iowa farmers were credited with a one-third larger house at one-third less value; they ate more food, and had more telephones, automobiles, and washing machines. The Ford employees had more bathrooms and inside toilets, but it may surprise many people that only a little over half of these supposedly highly paid wage earners had these city necessities in the city of Detroit. These city people spent an average of $32 for car fare to work—an expense unknown among farmers. They received, on the average, $1,695 from the Ford Motor Company as wages, $17 from boarders, roomers, and other sources, and on the average ran $8 into debt.

The above analysis indicates that the farmer received about as large an income as other classes during 1924 to 1929 but it tells us nothing about the rate of return on the farmers' invested capital. Some people believe that the farmers should have a larger income than wage earners in the cities because the farmer is both a laborer and a capitalist. This question of whether or not the farmer has more capital than the great majority of gainfully employed persons is debatable, and it depends on the definition of capital and the rate of interest used in capitalizing income into value. For example, education and training represent savings, hard work and cash outlays, and in this sense is capital although it cannot be separated from the individuals and sold. Which class has most of this form of capital? Even a $5,000 city home may represent as much real capital as a farm valued at $10,000. The fundamental difference in value may be due not to saving and accumulation of capital but to the relative price levels of consumers' goods and the real rate of interest used to capitalize incomes into value in the two places. (See footnote 6.)

Changes in Incomes Since 1929

Money incomes to most classes have decreased so rapidly since 1929 that in spite of the lower prices most people receive fewer goods and services. Figure 3 and Table 4 show a rough approximation of changes in incomes available for living of farmers and industrial workers based on the average of 1924 to 1929 equal to 100.

The changes in income to laborers are represented by dividing the Federal Reserve Board index of factory pay rolls by the Bureau of Labor Statistics index of cost of living. The resulting index makes full allowance for unemployment and part-time work

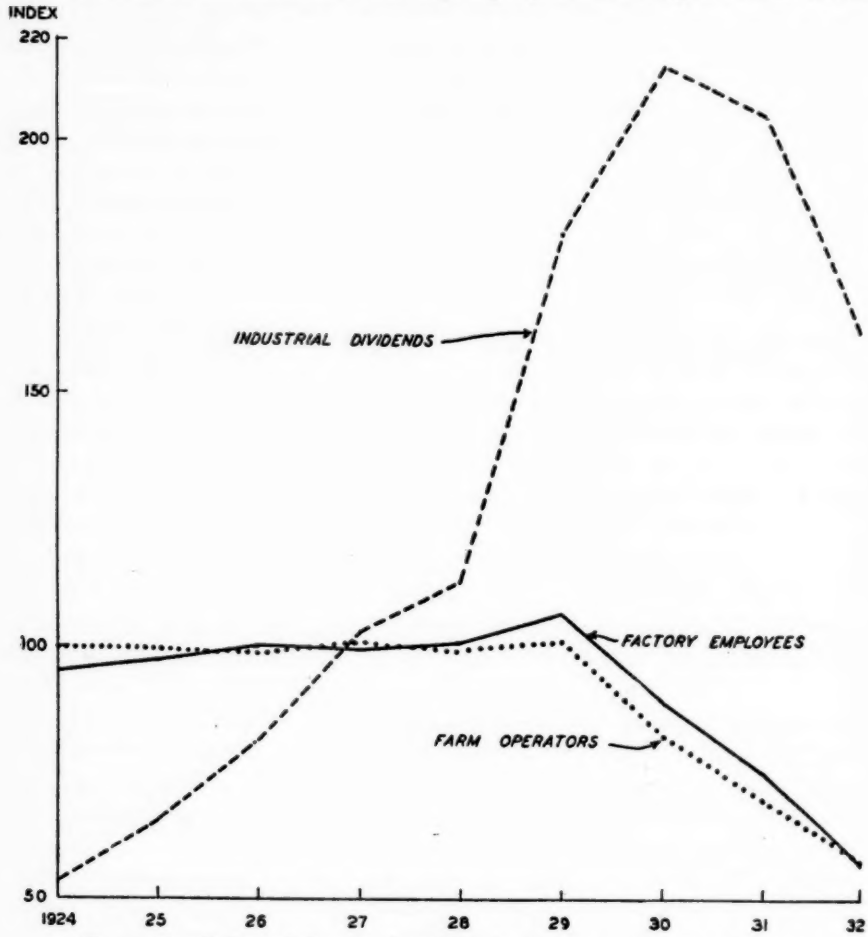

FIGURE 3.—Index of Income Available for Living and Cost of Living
Value of Industrial Dividends
1924-29 = 100

Based on Table VI.

of factory laborers except for changes due to growth of population, but it makes no allowance for incomes received through unemployment relief and charity. No attempt is made to measure changes in income to other classes of laborers, but it is believed that construction workers have had greater declines in

income, and railroad and public utility workers a little less. The changes in income to farmers are calculated by converting the data presented for the base period into an index similar to the cost of living index. The estimated relative value of income to farmers was between $1,548 and $1,740, only $740 of which was money income. The balance, or roughly 52 per cent of the total using the lower figure, represents the city equivalent value of food, fuel and housing furnished by the farm. Since the real value of these items is independent of the money values placed on them, a constant is given a weight of 52 points in estimating farmers' living. The other 48 points are estimated by converting the cash income from farm operations as shown in column 3 of Table 4 into an index of money incomes and dividing by the Bureau of Agricultural Economics index of "prices paid by farmers for commodities used in living." This assumes that money income from other sources varies with cash income from farm operations. The figures for 1931 and 1932 are rough approximations based on preliminary gross income data published by the Bureau of Agricultural Economics.

This index makes no allowance for the shifts that have taken place in the percentage of living furnished by the farm. For example, instead of selling eggs and corn to buy coal and canned fish, many farmers now eat the eggs and burn the corn. Many farmers have also let taxes go delinquent, defaulted on interest payments and not made the repairs and replacements provided for in the Bureau of Agricultural Economics estimates of cash income. To this extent farmers have maintained living out of capital. Laborers likewise have used up most of their savings.

Both of these indexes exaggerate the effect of changes in money incomes on living, but it is probable that the errors are nearly equal so that these two indexes show the relative economic position of farmers and laborers during this depression. Income available for farm living fell lower in 1930 and 1931 than the income to laborers, but by 1932 the incomes to both classes were equally low. Living for farmers cannot fall lower than the amounts furnished directly by the farm. Income to laborers in the city can fall to zero unless they get charity or manage to get out on a farm.

Since industrial wages are paid primarily by corporations, it is interesting to compare the relative purchasing power of dividends paid by industrial corporations during the corresponding period. For this purpose industrial dividend payments as tabu-

lated in Graphic Outlook Supplement to Babson's Barometer Letter have been converted into an index 1924-29 = 100 and divided by the Bureau of Labor Statistics index of cost of living to show what the relative value of these dividends would have been to the mass of the people if paid out as wages. The chances are that since relatively few and primarily wealthy people with other sources of income receive dividends, they have been used mainly to purchase federal, state and local tax exempt securities, many of which have been issued so as to give charity and create work for the unemployed. In this roundabout way of get-

TABLE 6.—INDEX OF INCOME AVAILABLE FOR LIVING AND INDUSTRIAL DIVIDEND PAYMENTS, 1924–1929 = 100

Year	Farm operators	Factory employees	Industrial dividend payments	
			Cost of living value	Actual dollars,[1] in millions
1924	99.9	95.0	53.7	$ 801
1925	99.9	97.1	66.4	1,019
1926	98.7	100.3	81.7	1,250
1927	100.9	99.7	103.1	1,555
1928	99.5	100.9	113.5	1,692
1929	101.1	106.8	182.7	2,726
1930	82.7	89.8	215.6	3,080
1931	70.2	75.4	206.2	2,663
1932	57.9	57.7	163.2	1,623[2]

[1] Graphic outlook-supplement to Babson's Letter, October, 1932.
[2] Total for first 10 months.

ting dividends into the hands of the wage earners, wealth, income and power are concentrated more and more into the hands of the relatively few.

These data on industrial dividends shown in Figure 3 and Table 6 must not be confused with the current income to corporations which is almost nothing, nor with the changes in the total income to investors because their income from other sources may have disappeared.

The depression was well under way for both farmers and laborers in 1930, but although stock prices had crashed late in 1929, industrial dividend payments in dollars increased to record heights in 1930. Surpluses kept out of purchasing power during earlier years were used to increase and maintain payments. Even during 1931 the payments in dollars were almost as large as in 1929, while in purchasing power they were greater. During the first ten months of this year dividend payments by industrial corporations almost equalled the total payments during the whole year of 1928. This does not apply equally to other dividend payments. For example, dividends paid by railroads in 1930 were

equal in dollars to amount paid in 1929, there was a slight decrease in 1931, and this year payments have fallen very low.

Farmers and laborers, two of the largest classes in society, are not benefiting from dividend and interest payments but are burdened with both direct and indirect taxes. In spite of the fact that all the people of the United States as a group have no debts, the farmers, home owners, towns, cities, irrigation districts, counties, states, and the federal government are burdened with debts. Payments are due from the many mainly to the owners of intangible wealth, much of which is in the form of tax exempt securities, or stocks, the dividends from which are exempt from normal income taxes.

The concentration of incomes and wealth in the hands of relatively few people with its resulting maldistribution of purchasing power is largely responsible for the present depression. So far, instead of the depression being self corrective, the concentration has become greater and the equities and incomes of the mass of the people have been greatly reduced. The wealthy are not wealthier in actual dollars but in many cases the total equity in property previously owned by small holders has been wiped out. However, if the depression continues long enough the large incomes and wealth concentrated in the hands of less than 5 per cent of the people will also be wiped out through default on bonds, lower corporation earnings, and perhaps confiscation. The old economic theory of self correcting economic forces will work if given time enough, but what a lot of suffering economic forces bring during such a process. Surely society can invent better means of bringing about desired changes which will not restore the old forces of pre-war or pre-depression days that led to this economic catastrophy but will furnish a new and firmer foundation for more lasting prosperity.

The relief measures adopted, such as the Reconstruction Finance Corporation, have been designed primarily to prevent this depression from getting worse and for maintaining past values of capital by continuing interest payments. The schemes for farm relief are nearly all based on the assumptions that farmers as a class were in an inferior economic position relative to other classes from 1921 to 1929 and that they are relatively worse off now. These assumptions apparently are based neither on facts nor on economic theory. If the incomes to farmers, or 30 per cent of the population, could be increased by decreasing the incomes through higher prices for food to the other 67 per cent of the

population, there would be no net social gain and no real relief of human suffering. For many years society has elevated the incomes of corporation stockholders by tariff price-raising measures and other systems of taxation, and now every one does, or at least ought to recognize the folly of such schemes for building up permanent economic prosperity. Yet many agricultural leaders advocate taxing the poor laboring man to help the poor farmer.

The problem is not new; 2300 years ago Plato and Aristotle recognized it, and without statistics they suggested definite ways of preventing economic catastrophies like the present. For example, they advocated a planned economy with agriculture as a basis for the society since it would be more stable and permanent; the limitation of wealth to be double or treble but not over four times the value of the land, any excess to be taken by the state; the fixing of limits to profits from trading and providing for the transfer of land only through inheritance (which would eliminate the farm mortgage problems); and the allocation and limitation of numbers to engage in various trades. As economists and statisticians, it is our duty to work for social welfare and not for special benefits to any one class at the expense of other classes.

Discussion by E. C. Young

Dr. Peterson's paper contains so many opportunities for profitable discussion that it becomes necessary to pass over many points with which issue might be taken. My discussion will be confined, to what appear to be major considerations.

Much of the paper is given over to an analysis of the relative position of the farmer by the use of two sources of information; the annual farm income estimates of the Bureau of Agricultural Economics and the estimates of the national income prepared by W. I. King.

After considerable overhauling and recalculation of these data, charts are presented which show that farm incomes compared favorably with industrial wages during the period 1924 to 1929, in a period which we have been wont to call the agricultural depression. The charts indicate that farmers and wage earners both fared very poorly as compared with persons who received dividends during this period. The inference is, that both groups suffered from extraordinary exploitation by capital during this period.

Those who have attempted to compare the income of farmers with the income of city persons realize the difficulty the writer encountered in his calculations. He finally arrives at a figure for farm privileges by doubling the farm value of food and charging the farmer $35 a month for house rent. Since this results in more than half of the total real farm income the possibilities are here, for presenting estimates in support of almost any

desired contention. Offhand it seems rather unfair to charge a farmer 35 cents a dozen for that last dozen unmarketable eggs, valued at 12 cents on the farm, after he has eaten eggs three times a day all spring. It would be just as reasonable to add a dollar and a half a day to the income of the janitor in the moving picture theater who saw three shows a day in his line of duty. Just because a farmer's house and lawn are bigger and the house has the same external appearance, is no reason for charging a rent equal to that paid by a city dweller who has as a part of his rental privilege, cheap gas, running water, sewer at public expense, electricity, paved streets and sidewalks, free garbage collection, daily paper delivery, telegraphic service, free ambulance service, electric railway service, good common schools and frequently colleges, public parks, free libraries, a $3 charge for the doctor's call against a $12 charge, free medical clinic and health service, cheap entertainment, the opportunity to keep roomers, and an endless list of other advantages as compared with the farmer's air cooled bedroom and cellar under half the house.

The money income calculation is a fair measure of income in the higher brackets but as the income approaches zero the farmer's non-cash income of food and shelter and the city man's non-cash income of privileges at public expense, become major considerations and give opportunities for wide differences in estimates of real income.

In order to arrive at a figure which indicates that farmers received about as large an average income as other classes from 1924 to 1929, the writer finds it necessary to exclude all city dwellers with $5,000 or more of annual income, but to include with the farmer group almost a million self-sufficing and part-time farms and a million or more negro croppers. He also fails to include a proper allowance for earnings on the farmer's capital on the grounds that the investment in education, dwelling and the like of other classes probably represents almost as large an investment as that of the average farmer. This seems scarcely consistent since he has ruled out all persons with incomes of $5,000 or over, who according to his own figures own and control the capital. After eliminating this high income class from the city group, it is doubtful if the remainder have as much invested in education as the farmers.

The classification of city people and the failure to classify farmers results in a very misleading comparison. The group finally selected for comparison with farmers should be compared not with the farmer as we ordinarily conceive him but with the landless class of persons living in the country made up of hired men, road workers, carpenters, masons, croppers, miners, lumbermen, and the like.

The writer summarizes this section of his paper as follows: "The schemes for farm relief are nearly all based on the assumption that farmers as a class were in an inferior economic position relative to other classes from 1924 to 1929 and that they were relatively worse off. These assumptions apparently are based neither on facts nor on economic theory."

Two very important facts and an economic theory based thereon have been completely left out of this discussion. After a good many years of fruitless effort to compare farmers' and city persons' incomes, I have come to the belief that there are two relatively safe indicators of the relative prosperity of agriculture or of other industries for that matter.

(1) If the capital values are shrinking both absolutely and relatively to other lines of business it is clear that the business is in a relatively unfavorable position. This is a fact easy to establish. In farming, capital assets were shrinking at an unprecedented rate during the period under discussion and very little new capital was attracted to farming during this period except for refunding purposes. At the same time the history of other industries was almost without exception one of continual writing up of capital assets and increasing wages. New capital was being continually poured into these industries during this period.

(2) If the conditions in the industry are such that the number of persons engaged in it is shrinking either absolutely or relatively to other industries, it is clear that opportunities, as measured by real income are not as attractive as elsewhere. Population in a commercial society responds to economic pressure and only moves out of an industry and to others as the difference in economic opportunity becomes evident. This is a fact easy to establish. During the period in question, farm areas lost population steadily and at a more rapid rate than at any previous period for which figures are available.

The present movement back to the country of certain classes is evidence of this same principle. Next to public employees probably no class of persons has felt the depression so little as the group made up of self-sufficient farmers, part-time farmers, hired men, occasional agricultural laborers and villagers. In the present crisis the movement back to the country serves principally to increase this class. This movement is filling up the idle tenant houses, extra houses on farms that have been combined, idle houses in country villages and cross road communities. Even in farming areas classified as submarginal by our economic planning friends there has been a reoccupation of houses that were thought to be uninhabitable.

In the latter part of his paper the writer enlarges his scope and finds in the maldistribution of wealth and income, as shown by the relative position of farmers, wage earners and capitalists the true cause of the depression. To quote, "The concentration of incomes and wealth in the hands of relatively few people with its resulting maldistribution of purchasing power is largely responsible for the depression." This explanation is put forward as though there were general agreement on this point. While time does not permit of further discussion of this point, I think we must admit that it is at least subject to controversy. The final conclusions are similar to those found in the last chapter of Glenn Frank's "Thunder and Dawn," written as such explanations usually are after the depression was under way.

This explanation becomes current following all major depressions. It is a natural consequence of deflation since the rather obscure creditor class now emerges as a relatively fortunate minority who become active in business through the necessities of default and foreclosure. Beyond question the creditor class gains possession of a greatly increased fraction of the world's capital and income during a period of deflation. To rank this as a chief, cause of the depression seems questionable and is scarcely supported by the evidence presented in this paper. To me it seems scarcely fair to give this inactive group of trust companies, insurance companies, widows and sons and sons-in-laws of former captains of industry, credit for having precipitated a catastrophy of such proportions.

The rapid growth in dividends relative to wages reported in the paper

is no more than could be expected. It was in line with the principle of the growth of earnings of large concerns as developed by Marshall many years ago. A period of protracted good times has an accumulating effect on the earnings of large concerns. According to Marshall it is equally true that these same large concerns find themselves with greatly depleted earning power and in a relatively unfavorable position compared with small concerns and individuals following a protracted period of depression.

Most of us will grant that a greater concentration of wealth has resulted in recent years through the increasing tendency of corporations to hold the securities of other corporations. Without questioning the validity of the figures which show that corporations received more interest than they paid out in 1928, the statement that "The interholding of interest bearing securities practically cancel and the stockholders virtually own the corporation outright" may be questioned. All that the figures can be fairly interpreted to mean, in my judgment, is that most of the investing of the American people is done through corporations. Certainly commercial banks, savings banks, building and loan associations, trust companies and insurance companies, which invest the money of persons with small incomes and whose interest receipts constitute a large share of the total interest received by corporations, can scarcely be said to be owned outright by the stockholders. The claims of depositors and other beneficiaries are prior to those of stockholders and the income of these institutions is distributed in forms other than as interest and dividends. While the concentration of wealth and the control of wealth may be a very serious matter, a fair interpretation of the data supplied, does not warrant the conclusion that the extreme concentration reported in the paper does in fact exist.

The final conclusions of this paper can only be classified as another arraignment of capitalism with an effort to support the conclusions by statistical evidence. The theory that capitalism as with feudalism before it, had within itself the seeds of its own destruction is as old as Marx. It is based on the theory, which many of us will grant, that in the long run through the operation of an uncontrolled, unplanned, economic order, the control of wealth and income is gradually concentrated until the life of the people is so completely in the hands of a few that only by revolution, confiscation and repudiation can a new deal be had and wealth be redistributed so that a new start can be made. The writer does not go so far as to state that the world has reached one of these crises. One is forced to this conclusion if he follows through the argument presented. The hope is held out that through economic planning redistribution of wealth and income may be achieved, but this thought is not followed up. To one who has never been convinced of the desirability of a completely planned economic order it appears that much of the economic planning to date has served to accelerate the concentration of wealth.

The complete absence of any reference to the monetary and exchange difficulties associated with the depression and with the disadvantageous position of the farmer is painful to one who has been accustomed to explain many of the farmers' difficulties in terms of the changing value of gold.

Although I do not find myself in agreement with many of the findings of this paper I wish to express my appreciation to Dr. Peterson for this stimulating and courageous presentation of his ideas. Prejudice should favor one who dares to run against the conventionally accepted explanations.

TESTING THE SIGNIFICANCE OF MEAN VALUES DRAWN FROM STRATIFIED SAMPLES[1]

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In agricultural economics many important statistics, especially those made available currently by the Bureau of Agricultural Economics, are based on a sampled population. In evaluating these statistics the usual problem of adequacy and significance arises. In increasing the accuracy of these statistics one outstanding difficulty that confronts those who collect and interpret them is the task of gaining control over the variations caused by heterogeneous elements other than the errors due to sampling. It is, of course, common knowledge that the original populations from which these samples are taken are seldom homogeneous with reference to the mean values that are being measured. Instead, virtually every sample is an aggregation of several distinct elements each of which contributes independently to the variability found within the sample. Consequently, each of these heterogeneous elements, unless offset by a large number of observations or isolated, affects, often seriously, the significance of the mean values.

The resolution of the total variability of a sample into the portions ascribable to two or more elements is possible with present statistical technique. Two steps are requisite. First, the sources of the variations must be detected and the heterogeneity belonging to them isolated. Second, there must be some means of determining whether or not the variations thus isolated and ascribed to presumed heterogeneous elements are in reality not due to the chance variations arising out of random sampling.

The problem of separating a sample into parts and testing each part independently for homogeneity or heterogeneity involves some important theoretical as well as practical considerations. The sub-samples of a stratified sample are usually small. It is only recently that the theoretical aspects of small samples have been sufficiently developed to permit the expansion of statistical methods to include formulas and arithmetic necessary to handle them.

The most notable advances along this line have been made by English mathematicians, particularly by R. A. Fisher and his staff of the Rothamsted Experimental Station. Outstanding

[1] Journal Paper No. B95 of the Iowa Agricultural Experiment Station, Ames, Iowa.

among their contributions has been a technique known as analysis of variance.[2] It was first published in its preliminary form by Fisher in 1923. This technique does two important things: (1) It brings the analysis in harmony with the theory of sampling first established by "Student," whereas many of the older forms of statistical analysis in common use do not take cognizance of the theory of small samples;[3] (2) it materially simplifies the arithmetic that is required to reduce the data to such summary expressions, the significance of which may be readily determined by using Fisher's z distribution.

In agronomic research, the science in which analysis of variance was originally developed, it is having profound effect upon field experimentation. The problem in agronomy is essentially one of isolating soil heterogeneity. Where members of the staff understand the principles underlying the method, the plot arrangements are being planned in such a way that the experimental results may be interpreted by this statistical technique.[4] Suf-

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[2] Variance is the square of the standard deviation.

[3] R. A. Fisher is undoubtedly the leading writer in the theory of small samples. His work in this field has revolutionized modern sampling theory.

[4] The following literature will be helpful to the student wishing to use analysis of variance:

Clapham, A. R. 1929. "The Estimation of Yield in Cereal Crops by Sampling Methods." *Journal of Agricultural Science*, Vol. 19. 214-235.

Eden, T. and Fisher, R. A. 1927. "Studies in Crop Variation IV. The Experimental Determination of the Value of Top Dressings with Cereals." *Journal of Agricultural Science*, Vol. 17. 548-562.

1929. "Studies in Crop Variation VI. Experiments on the Response of the Potato to Potash and Nitrogen." *Journal of Agricultural Science*, Vol. 19. 201-213.

Eden, T. and Yates, F. A. 1933. "On the Validity of Fisher's z Test When Applied to an Actual Example of Non-normal Data." *The Journal of Agricultural Science*, Vol. 23. 6-17.

Fisher, R. A. 1932. *Statistical Methods for Research Workers.* 4th ed. revised and enlarged. Edinburgh and London.

Fisher, R. A. 1926. "The Arrangement of Field Experiments." *Journal of the Ministry of Agriculture*, Vol. 33. 503-513.

Fisher, R. A. and Mackenzie, W. A. 1923. "Studies in Crop Variation, II. The Manurial Response of Different Potato Varieties." *Journal of Agricultural Science*, Vol. 33. 503-513.

Fisher, R. A. and Wishart, J. 1930. "The Arrangement of Field Experiments and the Statistical Reduction of the Results." *Imperial Bureau of Soil Science.* Technical Communication No. 10. Published by His Majesty's Stationery Office, London, England. 1-23.

Goulden, C. H. 1931. "Modern Methods of Field Experimentation." *Scientific Agriculture*, Vol. 11. No. 10. 681-701.

1932. "Application of the Analysis of Variance to Experiments in Cereal Chemistry." *Cereal Chemistry*, Vol. 9. No. 3. 239-260.

Irwin, J. O. 1931. "Mathematical Theorems Involved in the Analysis of Variance." *Journal of the Royal Statistical Society.* Vol. 94. 284-300.

Kirk, L. E. 1929. "Field Plot Technique with Potatoes with Special Reference to the Latin Square." *Scientific Agriculture*, Vol. 9, No. 11. 719-729.

Pearson, E. S. 1931. "The Analysis of Variance in Cases of Non-Normal Variation." *Biometrika*, Vol. 23. 114-133.

Richey, Frederick D. 1930. "Some Applications of Statistical Methods to Agronomic Experiments." *The Journal of the American Statistical Association*, Vol. 25. 269-283.

Schultz, Theodore W. and Block, A. G. 1933. "Variation in Swine Prices within Iowa, including a Study in Statistical Procedure." *Iowa Agricultural Experiment Station Research Bulletin* No. 161.

Schultz, Theodore W. and Snedecor, George W. 1933. "Analysis of Variance as an Effective Method of Handling the Time Element in Certain Economic Statistics." *Journal of the American Statistical Association*, New Series, Vol. 28. 14-30.

Tedin, Olaf. 1931. "The Influence of Systematic Plot Arrangement upon the Estimate of Error in Field Experiments." *Journal of Agricultural Science*, Vol. 21. 191-208.

Wishart, J. and Clapham, A. R. 1929. "A Study in Sampling Technique: The Effect of Artificial Fertilizers on the Yield of Potatoes." *Journal of Agricultural Science*, Vol. 19. 600-618.

Wishart, John. 1931. "The Analysis of Variance Illustrated in Its Application to a Complex Agricultural Experiment on Sugar Beet." *Wissenschaftliches Archiv Für Landwirtschaft Abteilung A. Archiv Für Pflanzenbau.* 5 Band. 4 Heft., 561-585.

fice it to say, at this point, that analysis of variance, a comparatively new weapon of research, has promise of wide application.

Scope of this Paper

The major purpose of this paper is to show, principally by example, that: (1) By using analysis of variance the significance of many statistics used by agricultural economists may be substantially improved; (2) the technique is essential to exploit fully and effectively materials drawn from a stratified or otherwise restricted random sample, and (3) it is necessary to plan the internal structural arrangement of a sample to fit the fundamental principles underlying the technique before maximum statistical results can be obtained. The best way to get an understanding of analysis of variance is by means of examples. With this in mind much of the remainder of the paper will be devoted to a study of corn yield estimates of Iowa. These estimates are samples and they will be used to illustrate the fundamentals of the procedure as well as the steps and calculations required to make the application.

It should be noted, however, that the need for stratification of samples has long been recognized, both by statisticians and students collecting economic data. In fact, a great deal of ingenuity has been employed in devising plans to isolate variations that are caused by disturbing heterogeneous elements. To cite one instance, the Crop Reporting Board of the Department of Agriculture, in obtaining crop yield estimates, has been confronted, among others, with geographic heterogeneity. Although yields are usually computed on a state basis, obviously they are not necessarily the same in all parts of a state. To gain some control over geographic differences in crop yields within the state, the Crop Reporting Board has employed a form of stratified sample. Briefly, this has been accomplished by dividing the state into districts, each of which is presumably more homogeneous than the state as a whole. This is an attempt to isolate one form of yield heterogeneity, i.e. geographical location. A recent bulletin by Sarle[5] gives in detail the procedure now used. He states clear-

[5] Sarle, Charles F. 1932. *Adequacy and Reliability of Crop-yield Estimates.* United States Department of Agriculture, Technical Bulletin 311. Research workers who are using statistics compiled by the United States Department of Agriculture welcome Mr. Sarle's study. Much of the information which this bulletin contains is indispensable to an understanding of the limitations of crop-yields estimates. There has long been a need of knowing more about how these data are gathered and reduced to the figures published currently. The bulletin is considerably more comprehensive in scope than the earlier treatment of farm price data (1927. *Reliability and Adequacy of Farm Price Data.* Department Bulletin 1480), particularly in its discussion of some of the theoretical phases of the problem of sampling. Mr. Sarle gives a description of the techniques employed in collecting and handling these data and an appraisal of their application.

ly the advantages that are attained by stratification. But, as is shown below, it is not possible to interpret effectively the results that are obtained from a stratified sample with the methods that Sarle uses.

When is a Result Significant?

In testing the significances of mean values whether of crop yields, farm prices, size of sow herds, farm wages, or land values, provided that the sampled population is normally distributed and that there is a random sample, we have recourse to the fundamental proposition that the standard error of the mean becomes $\sigma \sqrt{n}$. Although the original distribution is not exactly normal that of the mean usually becomes normal as the size of the sample is increased. This latter tendency justifies the wide use that is made of this proposition in problems where there is not sufficient evidence to show that the original distribution was normal but in which we are led to believe that the population does not belong to the exceptional type of distributions.[6] In discussing significance it is assumed, of course, that significance from a statistical viewpoint is clearly distinguished from whether or not particular statistics have any important economic meaning. The first is a mathematical test based on the theory of probability whereas the second involves interpretations resting essentially upon the economic theory and experience.

This procedure of testing the significance of mean values by calculating the standard or probable error, even though the sample is large, is frequently only a very crude approximation of the variability arising from sampling errors. The standard deviation thus obtained is, as was indicated at the outset, usually an aggregation of deviations some of which are due to heterogeneous elements that are readily discernible.

Take for example the spring pig surveys for Iowa, which show that the size of the average sow herd is in the neighborhood of eleven sows. The variations from this mean are large, not because the sampling errors are uncommonly large, but because of the actual heterogeneity within the original population. Most of the variations from the general mean, that is, the farmers reporting more or less than eleven sows, are to be ascribed to the

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[6] Pearson assures us that in applying the z test, involved in analysis of variance, we are not liable to make unexpected errors, provided that the deviation from normality is not extreme. Egon S. Pearson. "The Analysis of Variance in Cases of Non-normal Variation." *Biometrika*, Vol. 23. 114-133. 1931.

differences in the size of farms.[7] Obviously, the facts for Iowa are that a farmer operating a small farm, by and large, breeds fewer sows than his neighbor who has a large farm. Then, too, whether a farmer is located in northwest Iowa, where corn is usually produced in abundance, or in southeastern counties, which are frequently deficit in corn, definitely influences the number of sows that are bred.[8] As long as the variability in size of sow herds caused by the differences between different size farms and by the differences between districts is included, it is clear that the standard deviation, hence also the standard error of the mean, is at best but a crude measure of the fluctuations attributable to sampling or mere chance variations.

Restricted Random Arrangement

Without altering the essential conditions governing randomness, the structure of a sample may be so arranged as to facilitate the separation of those factors contributing heterogeneity. Thus the variability found within the sample can be divided into two or more parts. This is done by placing certain restrictions upon random selection. Let us suppose that the yields of corn vary markedly from one section to another in Iowa. In a sample drawn from such a population we have two kinds of variations which must be carefully distinguished. There are the variations caused by the actual geographic differences in corn yields. These we wish to eliminate in order to increase the accuracy, hence the value, of our results. The other sources of variation are due to sampling and are to be randomized to provide a valid estimate of sampling error. These latter errrors are uncontrollable in character, purely chance variations, and cannot be eliminated. The arrangement of the state into "randomized districts" makes

[7] An intensive study of the Iowa pig surveys, now being carried on by the Economics Department of Iowa State College, indicates for Iowa a very close correlation between the size of farms and the average number of sows farrowed. The following figures are averages based on an analysis of 21,000 farms reported in the Iowa spring surveys of 1930, 1931, and 1932.

Size of Farm Groups (in acres)	Average Size of Sow Herd
Under 59	4.0
60- 99	6.6
100-139	8.6
140-179	11.0
180-259	13.3
260-339	16.0
340-498	18.6
500 and over	29.2
Total	11.3

[8] For the three surveys mentioned in footnote 7, farmers situated in northwest Iowa reported an average of 16 sows farrowed per farm while those in the eastern and southern counties reported on the average between 7 and 10 sows farrowed per farm depending upon the district.

it possible to eliminate the differences in corn yields between districts attributable to geographical location.

Let us proceed and use the nine crop reporting districts of Iowa as the areas to be randomized. Within the nine districts, then, the crop yield estimates are obtained independently and, let us assume, wholly at random. If this is done, those elements which cause yield heterogeneity between townships or counties of the same district, will be completely randomized while those elements which cause differences in corn yields between different districts will be completely eliminated.

One additional comment before proceeding with an example. The arrangement of resolving a sample into sub-samples each of which is presumably more homogeneous than the larger sample, is an application of the principle known as "stratification." But mere stratification of a population into districts, type of farms, size of farms, or on the basis of any other factor or group of factors, has in itself little value unless it is practicable to analyze statistically the results gotten from a stratified population as a recombined whole, rather than as so many separate and distinct sub-samples.[9] It is for this purpose that analysis of variance has proven unusually satisfactory. We shall now consider the principles underlying the technique.

Iowa Corn Yields for 1930 Resolved into Randomized Districts

Normally, corn yields in Iowa are remarkably uniform.[10] In 1930, however, due to drouth, they varied widely. The yields appearing in Table 1 represent 378 sampling units;[11] each of these observations is allocated to the district from which it was obtained. These yield estimates are taken from the November listing sheets of the Iowa Office of the Crop Reporting Board.[12]

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[9] It should be said, however, that the Crop Reporting Board is finding an ever increasing demand for price, yield, and production data more detailed than is offered by the one summary figure for the state. District and county data are being requested. Nevertheless, a part of the analysis is lost unless the sub-samples are recombined.

[10] For Iowa corn yields, Sarle gives the coefficient of variability of the crop reporters' estimates as not exceeding 20 per cent in 1925, 1926, and 1928 and in 1927, when they varied somewhat more, it was slightly less than 25 per cent. Tech. Bull. No. 311, pp. 66-67.

[11] Sampling units are those parts of a sample located independently and at random within the area to be sampled. Each may be made up of one or many units. At least two sampling units are essential to provide a valid estimate of error. The distribution and number of units within the sampling units play no part whatever in determining the validity of the estimate. The relative accuracy of the estimate of sampling error is determined solely by the number of degrees of freedom on which the estimate is based. See: J. Wishart and A. R. Clapham, "A Study in Sampling Technique: The Effect of Artificial Fertilizers on the Yield of Potatoes." *Journal of Agricultural Science.* Vol. 19, 1929.

[12] These materials were made available to the writer through the courtesy of L. M. Carl, Crop Reporting Board, Des Moines, Iowa. The listing sheets gave the corn yields of 1,890 individual farms. These appeared by counties. To reduce the sample to a size suitable for treatment in this paper five reports were averaged to provide the sampling units or variates. This in no way invalidates the procedure nor the conclusion, except that a certain amount of information is lost in the averaging process, which, if used, would further refine our test of significance.

TABLE 1.—IOWA CORN YIELD ESTIMATES BY DISTRICTS FOR 1930
(bushels per acre)

Districts									Sums of Squares
North West 1	North Central 2	North East 3	West Central 4	Central 5	East Central 6	South West 7	South Central 8	South East 9	
34.3	39.2	40.0	41.0	24.0	42.4	41.6	20.0	25.7	11,158.94
34.6	37.7	52.2	36.8	22.7	53.3	40.0	16.5	39.4	13,478.32
23.3	35.6	39.7	37.6	44.3	44.8	39.9	26.4	36.7	12,405.49
40.0	48.2	43.9	32.8	29.7	48.3	35.2	24.5	34.8	13,191.60
23.8	40.3	42.3	31.9	38.5	40.6	31.9	35.2	34.8	11,595.73
31.7	46.1	43.5	29.5	43.0	47.3	37.0	38.4	33.7	13,958.14
37.7	42.5	41.0	27.5	35.0	41.9	28.9	29.8	38.9	11,881.86
33.0	36.4	44.1	27.3	34.9	46.8	48.7	36.6	41.1	13,912.77
36.4	37.6	53.2	30.0	39.9	51.1	23.8	31.8	33.6	13,378.82
35.5	46.3	35.2	32.7	28.2	47.3	33.7	29.0	25.9	11,392.30
32.1	40.8	44.7	37.4	46.6	44.8	40.7	23.0	40.3	14,080.08
36.8	38.1	38.5	41.4	35.7	51.8	42.7	30.4	23.9	13,278.45
40.0	33.6	53.2	34.8	33.2	38.0	31.8	24.5	39.0	12,448.97
32.7	48.4	41.2	31.2	27.7	49.6	28.9	23.3	40.5	12,328.53
40.3	38.2	35.6	36.8	41.7	37.4	37.2	25.0	32.0	11,875.42
30.0	42.0	49.3	39.3	42.4	48.5	34.3	36.3	34.7	14,487.26
24.3	42.9	48.2	28.1	44.5	39.2	35.2	35.9	30.3	12,506.58
39.0	36.2	41.7	37.4	40.0	34.2	27.9	23.7	41.7	11,817.72
39.4	39.1	42.8	35.5	35.8	50.6	38.2	27.4	34.3	13,401.75
33.8	41.4	46.1	35.0	36.4	44.7	41.1	29.3	26.7	12,790.25
29.7	36.9	33.1	25.2	46.3	38.3	32.0	29.8	26.3	10,188.66
39.4	37.6	38.2	31.9	29.4	54.6	36.2	25.4	43.9	13,171.30
31.5	42.0	41.9	37.8	39.5	42.1	32.0	27.3	43.9	12,969.86
38.8	38.5	40.6	37.0	32.8	45.2	31.5	35.8	38.7	12,895.51
37.3	37.4	44.9	39.7	41.0	36.4	41.2	37.7	38.8	14,012.28
30.2	32.4	37.8	37.8	26.0	40.9	31.7	22.5	27.6	9,441.19
25.2	35.6	51.0	31.6	40.7	40.9	32.8	36.5	34.2	12,408.99
25.8	32.2	45.3	34.2	36.7	52.6	41.9	29.8	30.9	12,636.32
30.0	36.6	44.4	28.2	40.0	51.0	31.1	26.8	31.7	11,897.50
37.0	38.9	39.3	23.3	43.0	45.6	37.3	23.3	34.4	12,015.49
29.2	42.0	48.4	36.0	38.5	40.6	32.7	36.3	29.2	12,625.43
28.5	40.9	43.0	38.3	29.4	39.1	31.6	48.5	41.5	13,267.18
29.3	42.0	38.1	25.7	42.2	47.1	37.3	33.1	34.7	12,424.83
33.1	40.5	50.7	29.8	32.8	57.9				10,622.64
34.7	43.8	40.5	37.2	46.2	39.5				9,841.31

TABLE 1.—IOWA CORN YIELD ESTIMATES BY DISTRICTS FOR 1930 (Continued)
(bushels per acre)

Districts									Sums of Squares
North West 1	North Central 2	North East 3	West Central 4	Central 5	East Central 6	South West 7	South Central 8	South East 9	
36.0	30.2	38.8	28.3	33.5	41.5				7,358.87
28.6	45.1	44.3	31.7	30.0	38.7				8,217.04
17.4	34.2	36.8	31.8	24.7					4,447.97
32.9	36.1	40.1	29.6	40.6					6,518.15
39.6	50.1		29.7	40.0					6,560.26
26.3	35.3		25.8x	29.3					3,461.91
41.2	45.7		33.5	41.0					6,589.18
36.6	33.6		24.8	33.8					4,226.00
41.6	39.2		34.8	34.1					5,641.05
39.2			22.9	27.6					2,822.81
33.2			36.8	32.5					3,512.73
35.3			24.2	40.4					3,463.89
37.7			34.9	29.0					3,480.30
35.4			35.4	26.8					3,224.56
37.8			19.6	29.0					2,654.00
24.8			32.8	42.5					3,497.13
			40.0	33.1					2,695.61
			31.2	46.4					3,126.40
			32.3	37.9					2,479.70
Sum of Squares: 58,325.76	69,506.82	72,786.52	58,611.52	71,994.79	75,178.14	42,211.82	30,496.28	40,653.38	519,765.03
Sums: 1701.2	1727.4	1673.6	1757.8	1940.9	1654.6	1167.9	979.8	1143.8	13,747.0
Number of Sampling Units: 51	44	39	54	54	37	33	33	33	378
District Means: 33.4	39.9	42.9	32.6	33.5	44.7	35.4	29.7	34.7	36.4

For the purpose of this study it may be assumed that the sampling units appearing within each district have been obtained independently and wholly at random, that is, the state has been stratified into nine randomized districts. The distributions of the magnitudes of the yield estimates within the several districts, while not exactly normal, appear to be of the normal type. The question of whether this sample is representative of the original population and whether it is free from bias need not concern us.[12] Our problem is not one of determining adequacy, essential as that is in the technique of sampling, but one of testing the significance of the means that are obtained. We assume, therefore, that

TABLE 2.—ANALYSIS OF VARIANCE OF IOWA CORN YIELD ESTIMATES FOR 1930 BASED ON A 9 DISTRICT DIVISION OF THE STATE

(1) Source of Variation	(2) Sums of Squares	(3) Degrees of Freedom	(4) Mean Squares	(5) Standard Deviation
Between means of districts	7,473.16	8	934.14	5.78
Within districts or sampling errors	12,344.76	369	33.45	7.25
Total	19,817.92	377		

the original values have been accurately reported, that they tend to be normally distributed about their respective means, and that the selection within each district meets the theoretical requirements of random sampling.

It is apparent from Table 1 that considerable variation in corn yields occurs from district to district. We proceed by dividing the total variability into two parts: (1) that variation in yields due to geographical locality of the district and (2) that variation which remains within the districts.

The arithmetic is not difficult. From the data in Table 1 the sums of squares in column 2 of Table 2 are calculated. The procedure will now be explained.

First. It is convenient to compute a "correction term," which is,

$$\frac{(13{,}747.0)^2}{378} = 499{,}947.11.$$

The divisor, 378, is the total number of yield estimates appearing

[12] As a matter of fact the yield estimates herein used have a definite upward bias. The final official state estimate of corn yields was 32.5 bushels an acre in contrast to 36.4 bushels, the mean value of the above estimates. The official figure is based upon a number of additional samples that are obtained from reporters who are not farmers. The main reason for the discrepancy is the fact that such crop reporters are better able than farmers, who fail to discount yields on their own farms sufficiently, to approximate the yields in their locality. Then, too, the official estimate takes into consideration the relation between yields reported by crop reporters and yields reported by the U. S. Census in census years.

in Table 1, the sum of which is 13,747.0. The correction term is the number subtracted from the sum of the squares of subsequent computations.

Second. The total "sum of squares" in the last line of column 2 is,

$$519,765.03 - 499,947.11 = 19,817.92.$$

This figure will be recognized as the sum of the squares of the deviations of the 378 yield estimates from the mean yield of 36.4 bushels.

Third. The sum of squares attributable to "between means of districts" is,

$$\frac{(1701.2)^2}{51} + \frac{(1727.4)^2}{44} \ldots + \frac{(1143.8)^2}{33} - 499,947.11 = 7,473.16.$$

The divisors are the number of yield estimates entering into each of the respective sum of squares in the numerator.

Fourth. The sum of squares due to "within districts" or sampling errors is equated to equal the difference and becomes

$$19,817.92 - 7,473.16 = 12,344.76.$$

This figure may be verified by computing for each district the deviations from the district mean, squaring them, and adding the results of the nine districts.

The sums of squares are now divided by the appropriate number of degrees of freedom to obtain the mean squares in column 4 of Table 2. The corresponding degrees of freedom are given in column 3. It is this feature (appropriate number of degrees of freedom) which brings the analysis into harmony with the theory of sampling to which it is applied. When a population is large and the standard deviation is given as $\sqrt{\frac{s(x-\bar{x})^2}{n}}$ where $s(x-\bar{x})^2$ is the sum of squares of the deviations and n the number of sampling units, but when the population is small the standard deviation becomes $\sqrt{\frac{s(x-\bar{x})^2}{DF}}$ where DF represents the degrees of freedom.[14]

[14] The formulas and tables that "Student" and, more especially, Fisher, have developed to handle materials involving small samples require that n be replaced by $n - 1$ in computing the variance or standard deviation and not as is frequently done (Sarle, *op. cit.*, p. 35, gives a common formula) in computing the standard or probable error. The reason for making the adjustment earlier in the calculations when small sample technique is employed is that the tables required to test significances (the t and z tables) are based on the assumption that $n - 1$ is used as a divisor in computing the variance or standard deviation.

The arithmetic for dividing the total sum of squares of the deviations of a sample into components has long been known to statisticians. It is the proportioning of the appropriate number of observations to each component that is of recent development. For instance, Bowley's formula, to which Sarle refers,[15] uses virtually the same arithmetic as is employed in analysis of variance. It does not, however, make any adjustment in the number of degrees of freedom which the restrictions involved in stratification necessitate. Bowley's formula tends, therefore, to underestimate the variance; consequently, the standard error of the mean is in reality greater than the formula indicates. Furthermore, the calculations required are quite onerous.

The degrees of freedom are based upon the number of independent comparisons corresponding to each of the sums of squares calculated.[16] In the study at hand, there are 378 individual yield estimates; therefore, 377 independent comparisons can be made among the yield estimates in Table 1. This, then, gives us in all 377 degrees of freedom. This corresponds to "Student's" modification of the standard deviation in which the sum of squares is divided by $n - 1$ instead of by n[17]. In the same manner the nine districts give eight independent comparisons between districts; hence eight degrees of freedom. This leaves 369 more to be considered. Our yield estimates are different within the different districts. Within district 1 there are 50 such independent comparisons; in district 2, 43; and so on to district 9, with 32. These total to 369 degrees of freedom and are taken as the divisor of the variance attributable to sampling error. We have, therefore, not only an identity between the various sums of squares, with the total sum of squares equal to the sums of squares for districts and sampling error; but, we also have an identity between the degrees of freedom apportioned to "between" and "within" districts.

The first important thing to settle is whether the mean square for between means of districts is significantly greater than that for within districts. If all of the 378 yield estimates were obtained at random from a normal homogeneous population these two mean squares would differ only by a small amount due to

[15] Sarle, *op. cit.*, p. 54.

[16] The term "degrees of freedom" is often quite confusing to students not familiar with Fisher's work. In another paper by the present author and George W. Snedecor, "Analysis of Variance as an Effective Method of Handling the Time Element in Certain Economic Statistics," *The Journal of the American Statistical Association*, New Series, Vol. 28, on pp. 18-19, 1933, a more complete discussion of "degrees of freedom" is given. Also see R. A. Fisher and J. Wishart. "The Arrangement of Field Experiments and the Statistical Reduction of the Results," *Imperial Bureau of Soil Science*, Tech. Communication No. 10.

[17] *Biometrika*, London, 6, 1-15, 1908.

random variations. In testing whether or not the difference between the two mean squares is significant, we decide that either the yield estimates are to be regarded as belonging to one homogeneous population or that they are more properly regarded as belonging to several populations of different district means, even though they have in common the same factor of sampling error.

The two mean squares appearing in column 4 of Table 2 are summary expressions of the corn yield estimates which are capable of being tested as to "whether one estimate of variance derived from $n_1$degrees of freedom is significantly greater than a second such estimate derived from n_2 degrees of freedom."[18] This is known as the z test, z being defined as one-half the natural logarithm of the quotient of any two mean squares as those in Table 2. With the following modifications, common logarithms may be used. Take the,

$$\begin{aligned} \text{log. } 934.14 &= 2.9704 \\ \text{log. } 33.45 &= 1.5244 \\ \text{Difference} &= 1.4460 \\ \text{Calculated } z &= (1.4460)(1.1513) = 1.6648. \end{aligned}$$

The multiplier, 1.1513 ($=\frac{1}{2}$ of 2.3026) effects the division by 2 as well as the transformation to natural logarithms.

Fisher[19] gives two tables of z for known number of degrees of freedom. One of these tables gives the values of z which will be reached or exceeded in 5 per cent of samples drawn from a homogeneous population. The 5 per cent point is analogous to twice the standard error. In the second table the values reached or exceeded by only 1 per cent of such samples are tabulated and it is similar to 2.6 times the standard error. In our problem, n_1, the number of degrees of freedom corresponding to the larger mean square is 8 and, n_2, the number of degrees of freedom for the smaller mean square, is 369. The 5 per cent value of z is by interpolation 0.3373 while the 1 per cent value is approximately 0.4699. Since the value of the z which we have calculated for the yield differences between district means and sampling error is larger than either, we conclude that the variations due to yield differences are highly significant. Had our calculated z been only 0.4699, the variations isolated for between means of districts would arise by chance less than once in a hundred samples col-

[18] Fisher, R. A. *Statistical Methods for Research Workers.* 4th ed. revised and enlarged. Edinburgh and London, 1932, p. 206.

[19] Fisher, R. A. *Op. cit.*, pp. 224-227.

lected from this same population. The conclusion from this evidence is, with a wide margin of assurance, that geographical locality introduced heterogeneity into the corn yield estimates of Iowa in 1930. The differences in corn yields between districts isolated by stratification is not to be ascribed to variations arising from random sampling.

By isolating the geographic differences in corn yields between districts the remaining variance is reduced almost to 63 per cent of its previous value. The known precision of the mean value is much improved. The standard error of the general mean becomes

$$\sqrt{\frac{33.45}{378}} \text{ and } = 0.297 \text{ bushels}$$

instead of 0.373 bushels, the figure that is obtained when the geographic differences in corn yield are not removed. By using randomized districts the calculated standard error of the mean has been reduced one-fifth. This increases the known precision of the general mean 56 per cent, for only by increasing the sample from 378 to about 590 observations from the same population could the same statistical assurance have been attained.[20]

Before taking up the calculation of the standard error of the several district means it might be well to repeat that all of the foregoing analysis assumes that the distribution of the values in each of the sub-samples, the state sample, and in the remaining variance are normal in character. But what assurance is there that these values are exactly normal? In practice, the research worker, more often than otherwise, has no means of determining whether or not the variation in his population is exactly normal. The assumption of normality is, indeed, a disquieting element in virtually all statistical work. Although the investigations bearing on this phase of the problem are few they should assure rather than alarm the student employing analysis of variance technique. For example, E. S. Pearson[21] points out that by applying the test used in analysis of variance we are not liable to make unexpected errors, provided that the deviation from normality is not extreme. Where the standard deviation becomes an unsatisfactory measure of variability there is, of course, danger in accepting the conclusion. Pearson adds, "It seems probable that the

[20] Had the standard error been reduced to one-half, which is often possible in crop yield estimates of a state, the known statistical reliability of the mean would have been enhanced at least four-fold.

[21] Pearson, Egon S. "The Analysis of Variance in Cases of Non-Normal Variation." *Biometrika*, Vol. 23. 114-133. 1931.

more elaborate forms of analysis of variance are also of fairly wide application, provided that the number of degrees of freedom apportioned to the residual variation is not too small.[22] It is of interest to note that in a recent investigation Eden and Yates[23] found Fisher's z test valid when applied to an actual example of non-normal data. They conclude that there is little to fear in the employment of analysis of variance and the z test in actual practice even when the distribution is of a definitely skew nature and the population extends over a wide range of values.

Let us return now to the mean square for "within districts." This figure is in reality a generalized measure of the errors due to sampling for all districts of the state. If we assume that the district samples may be regarded as having been drawn from populations having a common variance, it materially simplifies the calculation of the standard error of the mean of any district. Since the individual yield estimates are collected in each district by essentially the same technique, the assumption of a common variance appears fairly reasonable. In substance, the argument is to the effect that the numerous uncontrollable factors that influence farmers in their estimate of corn yields in one district, other than geographical differences in actual yields, are presumably the same as those that influence farmers who report corn yields in any other district of the state. But should we suspect any additional element productive of heterogeneity, it too can be isolated and tested for heterogeneity or homogeneity, in the same way as was done for the element of geographical locality. For instance, should we have any reason to believe that differences in size of farms caused some yield variability, that is, assuming that large farms have higher (or lower) corn yields than small farms, this factor, as is done later in this study, can be removed from the variance. Because the average size of farms in Iowa vary from one district to another, it is quite possible, provided that corn yields on large farms differ from those on small farms, that the residual sums of squares, our measure of sampling errors, are not a satisfactory measure of the variability ascribable to random sampling. Under such circumstances, although one form of heterogeneity (geographical) has been isolated the residual variance would still be a comparatively crude approximation of sampling variability. Obviously, it is, therefore, highly important that every effort be made first to discover

[22] Pearson, *Op. cit.*, p. 133.

[23] Eden, T. and Yates, F. "On the Validity of Fisher's z Test When Applied to an Actual Example of Non-Normal Data." *The Journal of Agricultural Science*, Vol. 23. 6-17. 1933.

and then to isolate all elements contributing variability, other than the purely uncontrollable chance variations. For then, and only then, can the residual variability be ascribed solely to sampling variance common to all parts of the sample.

In practice, however, the worker can readily establish whether or not the variability found in one district differs significantly from that in another district. It is known that when the number of observations are small the estimate of variance obtained from different samples of the same population may differ rather widely.[24] If the estimated variance ascribable to sampling errors does not vary more from district to district than is to be expected from random sampling the residual variance of each of the nine districts can be pooled and treated as a common variance. It is this step, as is shown in Table 3, that facilitates and improves the reliability of our statistical measure of the sampling variability of the sub-samples. The following formulas give the standard errors.

The standard error for the mean of any district is

$$\sqrt{\frac{33.45}{nd}} = \text{for example, district 9} = \sqrt{\frac{33.45}{33}} = 1.007 \text{ bushels.}$$

The standard error for the difference between the means of any pair of districts is given by the usual formula,

$$\sqrt{\frac{33.45}{nd_1} + \frac{33.45}{nd_2}}$$

Table 3 is instructive. Observe the differences between the standard errors computed from the variance (last column) isolated for "within districts," and that obtained by calculating the standard error for each district independently by the usual procedure. For instance, districts 7, 8 and 9 with 33 reports apiece gave standard errors of 0.907, 1.150 and 0.955 bushels respectively compared with 1.007 bushels obtained by analysis of variance procedure. Districts 4 and 5, each based on 54 cases, gave

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[24] The fact, that with small samples, such as are common in sub-samples of a stratified sample, the variance of the population can only be roughly approximated from the sample, seriously affects the use of the standard error. For a discussion of this point along with the modification required to employ "Student's" distributions and more recent tables, see R. A. Fisher. *Op. cit.*, pp. 110-111.

In agronomic research it has been shown that the distribution of variance calculated from a series of plots having different treatments agrees fairly well with the theoretical distribution of the variance given by "Student." See John Wishart, "The Analysis of Variance Illustrated in Its Application to a Complex Agricultural Experiment on Sugar Beet." *Wissenschaftliches Archiv Für Landwirtschaft.* Abteilung A. Archiv Für Pflanzenbau. 5 Band. 4 Heft., p. 562. 1931.

0.676 and 0.900 bushels by the common formula and a standard error of 0.787 bushels by analysis of variance.

The important consideration of this comparison is that the figures in the last column of Table 3 are more reliable than those in the preceding column. For example, 1.007 bushels is a better estimate of the standard error of the mean of districts 7, 8, and 9 than the figures obtained by calculating the standard error for each district independently by using the proposition $\sigma/\sqrt{n}$. Note that in analysis of variance we have taken advantage of addi-

TABLE 3.—A COMPARISON OF THE STANDARD ERRORS CALCULATED DIRECTLY FROM THE YIELD ESTIMATES WITH THOSE OBTAINED BY USING ANALYSIS OF VARIANCE
(Based on data in Table 1; Iowa Corn Yields, 1930)

State and District	Number of Reports	Average Yield (bushels)	Standard error of the average yield	
			Usual Procedure $\sigma/\sqrt{n}$ (bushels)	Analysis of Variance (yield heterogeneity isolated and variance pooled) (bushels)
State	378	36.4	0.373	0.297
1	51	33.4	0.768	0.810
2	44	39.2	1.008	0.872
3	39	42.9	0.768	0.926
4	54	32.6	0.676	0.787
5	54	35.9	0.900	0.787
6	37	44.7	0.956	0.951
7	33	35.4	0.907	1.007
8	33	29.7	1.150	1.007
9	33	34.7	0.955	1.007

tional information. By pooling the sampling variance common to all districts, after the variation in corn yields attributable to geographic locality was isolated, an average measure of the variability arising from random sampling remains. Because this residual is based on information drawn from the entire nine districts, it provides us with a more stable and exact measure of the variability due to uncontrollable or chance variation. In substance, we are able to calculate a standard error for each district from the combined variance and thus remove some of the sampling variability that is theoretically known to exist when the number of observations are small. The standard error thus calculated, therefore, is, on the assumption that the several districts have a common sampling variance, a more accurate description of the sampling variability of each district.

At this point, two things have been accomplished by the technique of analysis of variance not practicable by more common statistical methods.

(1) By isolating the geographic variation in corn yields be-

tween districts the calculated standard error of the average corn yield of Iowa for 1930 has been reduced from 0.373 bushels to 0.297 bushels, thus increasing its statistical precision about 56 per cent, while at the same time full cognizance has been taken of the reduced number of degrees of freedom that resulted from the restrictions placed upon the population of the state when it was stratified into districts.

(2) The calculated standard error of the average corn yield of any district, while it may be either smaller or larger than that obtained by computing the standard error for each district independently, is a more reliable measure because in analysis of variance the sampling variations of the several districts (subsamples) of the state have been pooled thus correcting for some of sampling variability known to exist in small samples.

Geographic Corn Yield Heterogeneity Isolated by Counties

Additional yield differences may be separated out by reducing the state to a county basis. Using the same data as before the

TABLE 4.—ANALYSIS OF VARIANCE FOR IOWA CORN YIELD ESTIMATES FOR 1930, BASED ON A 99 COUNTY DIVISION OF THE STATE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	Standard Deviation
Between means of county	13,352.22	98	136.25	4.81
Within county or sampling errors	6,465.70	279	23.17	7.25
Total	19,817.92	377		

yield estimates are treated as belonging to 99 counties and the yield heterogeneity between county means isolated. The total sum of squares of deviations from the general mean remains 19,817.92. The sums of squares for "between" and "within" counties are calculated in exactly the same manner as in the preceding example. Of the total 377 degrees of freedom, 98 now go for the comparisons between county means leaving 279 for the comparisons within the counties. The following table summarizes the analysis.

We note by inspection that the mean square due to geographic yield variations is virtually 6 times as large as the variance due to sampling errors. With the large number of degrees of freedom that each of these components enjoys the z test is not necessary to establish significance. However, observe the margin between them. By interpolation we find Fisher's z at the 1 per cent point for $n_1 = 98$ and $n_2 = 279$ to be approximately 0.1859 compared with 0.8858, our calculated z.

The mean square attributable to sampling errors has been reduced from 33.45, when the yield differences between the 9 districts were isolated, to 23.17, a further reduction of 30 per cent. The calculated standard error of the average yield of the state now is

$$\sqrt{\frac{23.17}{378}} = 0.248 \text{ bushels.}$$

As before, the standard error for the average yield of any county is readily determined by taking,[25]

$$\sqrt{\frac{23.17}{nc}}$$

Doubly Restricted Arrangements: Isolating Differences in Corn Yields Due to Size of Farm as Well as Geographic Yield Differences

In suitably planned sampling the technique of stratification may legitimately be extended to facilitate the isolation of more than two heterogeneous factors. Returning to our first example in which the corn yields of Iowa were divided into 9 randomized districts, by placing additional restrictions upon the original sample the yield estimates within each district may be further grouped into large and small farms. The following arrangement may be employed. The yield estimates appearing within 9 districts may be placed into two sizes of farm groups: Those farmers reporting 68 acres of corn and over, and those having 67 acres and less.[26] With 378 sampling units providing 377 degrees of freedom, 8 will represent district differences; 1 will go for differences between different "acreage in corn" groups; 8 more represent interaction between district means and "acreage in corn" group means; and 360 will remain for an estimate of sampling error.

In making a double restriction of this kind it is essential to meet certain theoretical requirements, namely, that each district "acreage in corn" group cell have in it the same number of sampling units. To do this it has been necessary to rearrange the

[25] It is often important that the various strata of a stratified sample be weighted so as to better the representativeness of the sample. In the two examples thus far employed in this paper this has actually been accomplished. The data have been self-weighting. Those districts and counties in Iowa in which corn is more important relative to the total crop acreage than it is in other districts and counties are represented by more observations. This method of weighting a sample is open to the objection that it is not easily controlled. For instance, when the number of reports from a sub-sample exceeds the quota indicated by the acreage of the district the reports in excess of the quota must be discarded. This is a difficulty which has not been solved satisfactorily. But since there is a tendency for the number of reports obtained to parallel closely the importance of the area they represent, the problem can be handled by adjusting the sample to a self-weighting basis. The loss of a few observations would be more than offset by the increase attained in statistical significance.

[26] Sixty-seven acres were taken as the division point because it was the average acreage in corn reported by the 1,890 farmers.

TABLE 5.—IOWA CORN YIELD ESTIMATES FOR 1930 ARRANGED INTO 9 DISTRICTS AND INTO 2 "ACREAGE IN CORN" GROUPS
(bushels per acre)

Corn Acreage	North West (1)	North Central (2)	North East (3)	West Central (4)	Central (5)	East Central (6)	South West (7)	South Central (8)	South East (9)	Sum of Squares
67 acres and under	43.5	61.0	42.0	32.0	28.9	42.3	41.2	19.2	24.7	13,701.92
	37.7	43.0	36.8	36.1	27.7	45.1	35.8	30.6	27.0	11,676.04
	30.9	40.2	50.1	37.6	30.1	44.3	42.7	20.0	38.4	13,060.97
	27.2	35.1	42.4	31.0	23.0	51.1	42.0	19.0	40.3	11,619.91
	37.6	38.8	48.4	30.4	38.8	53.0	40.5	27.0	35.7	14,144.10
	31.4	42.7	42.8	33.6	39.8	41.3	31.6	24.1	33.0	11,728.15
	40.7	39.5	49.5	28.0	43.0	43.2	25.0	28.5	31.2	12,576.92
	23.8	44.6	44.4	24.7	41.2	55.9	45.0	22.7	34.3	13,676.08
	27.2	34.7	50.6	32.2	34.6	37.5	47.6	33.6	38.2	12,998.50
	33.4	42.2	45.5	27.3	37.5	42.4	29.6	33.0	31.6	11,879.67
	38.6	38.5	43.8	29.8	41.2	46.8	37.1	37.5	35.9	13,737.84
	36.8	45.2	43.1	24.0	39.7	49.6	30.1	40.2	26.9	13,112.80
	44.1	41.9	44.5	32.1	33.4	42.4	34.7	26.9	27.6	12,313.86
	32.9	35.7	54.8	39.0	37.6	38.3	32.4	25.1	39.0	12,962.36
	23.4	37.9	48.3	21.1	31.3	33.0	37.2	26.2	42.0	10,665.04
	28.8	35.8	52.1	33.5	35.1	40.0	30.3	23.2	35.1	11,468.09
	30.4	43.8	40.0	36.4	38.9	41.5	41.8	35.6	25.8	12,683.26
	36.3	39.5	40.1	37.0	31.2	50.7	35.0	29.4	31.8	12,499.48
	34.5	44.4	29.7	34.5	25.8	43.1	24.0	29.0	25.9	9,845.01
	34.4	41.9	42.9	40.3	48.8	43.1	22.7	25.2	22.1	12,281.26
	37.5	37.5	41.8	38.5	35.0	49.2	30.7	24.5	40.3	12,854.46
Sum of Squares	24,756.37	36,166.47	42,137.02	22,504.77	27,050.12	42,139.40	26,841.32	16,729.91	23,160.34	261,485.72
Sum	711.1	863.9	933.6	679.1	742.6	933.8	737.0	580.5	686.8	6,868.4
Av. Yield	33.9	41.1	44.4	32.3	35.4	44.5	35.1	27.6	32.7	36.3
68 acres and over	36.2	42.2	53.0	43.0	36.8	50.0	36.4	36.9	25.0	14,915.09
	38.4	40.0	60.0	31.6	29.3	44.6	34.4	24.0	41.3	13,985.82
	39.7	32.1	39.0	35.0	25.7	41.7	40.8	26.7	41.1	11,818.62
	33.8	39.2	38.4	38.2	30.5	51.1	39.2	25.0	36.3	12,633.67
	25.0	44.4	36.7	35.5	41.4	50.4	42.6	24.4	55.1	14,903.75

TABLE 5.—IOWA CORN YIELD ESTIMATES FOR 1930 ARRANGED INTO 9 DISTRICTS AND INTO 2 "ACREAGE IN CORN" GROUPS
(Continued)
(bushels per acre)

Corn Acreage	North West (1)	North Central (2)	North East (3)	West Central (4)	Central (5)	East Central (6)	South West (7)	South Central (8)	South East (9)	Sum of Squares
	31.2	33.0	30.8	33.8	40.6	43.0	35.2	24.9	25.1	10,139.94
	29.5	41.9	32.9	30.2	44.0	35.5	33.3	21.7	31.3	10,376.03
	22.4	48.1	50.0	27.6	32.9	49.0	32.0	37.2	35.5	13,228.63
	25.9	37.4	54.0	31.2	38.1	49.8	27.5	37.8	34.8	13,286.79
	30.8	30.8	43.0	29.1	36.2	30.3	32.1	38.2	30.0	10,211.27
	40.1	45.7	40.0	35.4	43.6	40.0	38.3	37.0	34.9	14,104.52
	38.4	42.4	50.0	30.5	35.9	40.0	34.0	36.5	37.6	13,493.39
	37.4	34.0	30.8	36.9	40.0	46.7	39.8	37.9	41.1	13,355.56
	32.8	32.6	36.4	32.9	39.6	70.0	32.5	32.1	43.8	15,019.23
	35.6	36.1	48.0	27.1	40.0	45.6	29.8	20.0	41.2	12,273.82
	39.3	35.5	20.0	24.0	32.2	36.7	37.6	36.4	37.4	10,301.95
	27.0	35.8	52.0	32.7	44.0	60.0	45.6	36.7	33.6	15,875.14
	31.4	38.6	37.5	37.2	28.6	51.1	42.7	22.0	28.6	11,820.43
	36.6	27.5	38.4	31.5	32.7	53.3	42.2	26.9	27.8	11,750.09
	34.6	39.8	37.5	38.4	40.4	53.6	36.7	20.0	29.4	12,778.38
	35.2	40.0	27.9	29.7	33.5	65.7	32.5	28.9	44.4	13,801.10
Sum of Squares	23,953.17	30,805.23	36,894.57	23,168.41	28,518.68	50,236.56	28,334.56	19,916.42	28,245.69	270,073.22
Sum (21)	701.3	797.1	856.3	691.5	766.0	1008.1	765.2	631.2	755.3	6,972.0
Av. Yield	33.4	38.0	40.8	32.9	36.5	48.0	36.4	30.1	36.0	36.9
Total Sum (42)	1412.4	1661.0	1789.9	1370.6	1508.6	1941.1	1502.2	1211.7	1442.1	13,840.4
Total Sum of Squares	48,709.54	66,971.70	79,031.59	45,673.18	55,568.80	92,375.89	55,175.88	36,646.33	51,406.03	531,558.94

data. A new set of sampling units had to be calculated from the yield estimates given on the original listing sheets. The yield estimates in Table 5 are, therefore, not strictly comparable with those in Table 1. It is highly important that the structure of a sample be arranged into the desired stratum before the sample is taken. Obviously, this was not possible for the corn yield data at hand. The example is included chiefly to illustrate the procedure when several heterogeneous factors are being isolated.

The necessary sums of squares are computed thus:

(1) The correction term $= \frac{(13{,}840.4)^2}{378} = 506{,}763.68.$

(2) The total sum of squares of the deviations from the general mean is

$$531{,}558.94 - 506{,}763.68 = 24{,}795.26.$$

(3) The sum of squares for "between means of districts" is

$$\frac{(1412.4)^2 + (1661.0)^2 \ldots + (1442.1)^2}{42} - 506{,}763.68 = 9600.72.$$

The number 42 is used as the divisor because there are that many yield estimates in each term of the numerator.

(4) Sum of squares for "between means of acreage in corn groups,"

$$\frac{(6868.4)^2 + (6972.0)^2}{189} - 506{,}763.68 = 28.39.$$

(5) Sum of squares for interaction between district means and acreage in corn group means,

$$\frac{(711.1)^2 + (863.9)^2 \ldots + (755.3)^2}{21} -$$

$$(506{,}763.68 + 9600.72 + 28.39) = 564.79.$$

(6) Sampling error is the remainder

$$14{,}601.36.$$

The following analysis of variance table may now be set up.

TABLE 6.—ANALYSIS OF VARIANCE OF IOWA CORN YIELD ESTIMATES FOR 1930 FOR 9 DISTRICTS AND 2 "ACREAGE IN CORN" GROUPS

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares
Between means of district	9,600.72	8	1,200.09
Between means of "acreage in corn" groups	28.39	1	28.39
Interaction: Between district means and "acreage in corn" group means	564.79	8	70.60
Sampling errors	14,601.36	360	40.56
Total	24,795.26	377	

To test whether the mean square for "between means of districts" is significantly greater than the mean square for sampling errors we have,

$$\begin{aligned} \log.\ 1200.09 &= 3.0792 \\ \log.\ \ 40.56 &= 1.6081 \\ \text{Difference} &= 1.4711 \end{aligned}$$

$$\text{Calculated } z = (1.4711)\ (1.1513) = 1.6937.$$

Fisher's z at the 1 per cent point for $n_1 = 8$ and $n_2 = 360$ is 0.4702 approximately. Therefore, as in the preceding analysis, the geographical variation in corn yields between districts is found to be highly significant.

Since the mean square for the "between means of 'acreage in corn' groups" is slightly less than the variance attributable to sampling, there is no difference to be tested. The sum of squares separated for the farms reporting 67 acres and less was no greater than is to be expected from the mere chance variations in corn yields arising out of random sampling. Although the average corn yields for the farms with 68 acres and over was 36.9 bushels compared with 36.3 bushels for the farms with 67 acres and under this difference in yields, on the basis of the above test, is clearly non-significant. We assumed that the size of farms had an influence upon corn yields. The evidence is that for 1930 this was not true.

For the interaction between district means and "acreage in corn" group means we have,

$$\begin{aligned} \log.\ \ 70.60 &= 1.8488 \\ \log.\ \ 40.56 &= 1.6081 \\ \text{Difference} &= 0.2407 \end{aligned}$$

$$\text{Calculated } z = (0.2407)\ (1.1513) = 0.2771.$$

Here, too, $n_1 = 8$ and $n_2 = 360$. Tabular z at the 5 per cent point is about 0.3374 or considerably larger than our calculated z. We conclude that the geographic situation of the district had no influence upon the variations in corn yields between large and small farms. The interrelationship of these two factors for each district and for the state as a whole was such as is to be expected from the chance variations inherent in random sampling.

In investigating the presence of heterogeneous elements in Iowa corn yield estimates it was found that some elements are productive of heterogeneity while others are not. Geographical locality belongs to the first class and size of farms to the second. The technique of analysis of variance makes it possible to estab-

lish once and for all whether or not the variability isolated and ascribed to a particular element is significant. By this test we are able to decide that either the estimates of variance belong to several populations of different means, or that they more properly are to be considered as coming from one homogeneous population. The method therefore opens the way by which the principle of stratification can be greatly extended in future research. Thus far, in agricultural economics, stratification has been employed chiefly to handle geographical distribution. It, however, has promise of much wider application. In properly planned sampling there is no reason why it should not be used to gain control over many forms of heterogeneity which at present seriously affect the significance of the mean values.

Summary

1. Because of the many heterogeneous elements that are commonly found in sampled populations, upon which some of the most important statistics employed by agricultural economists are based, the question of the significance of the mean values calculated from such samples is raised.

2. Because of heterogeneous elements the standard or probable error of the mean, even when the sample is large, is usually only a crude approximation of the variability arising from sampling error. The refinement of our statistical measures of sampling variability is, of course, desirable.

3. Recent contributions in the field of small samples and the technique of analysis of variance make it possible to effectively isolate heterogeneous elements and thus increase the known statistical accuracy of the mean values. The procedure involves the principle of stratification.

4. When a sample is stratified certain restrictions are placed upon the random arrangement of the sample. These restrictions reduce the degrees of freedom available for computing the sampling variance. If the appropriate reduction in the number of observations that are surrendered for the privilege of stratifying the sample is not made, the calculated variance, hence the standard error, is under-estimated.

5. Analysis of variance technique provides a relatively easy and unusually satisfactory means of handling a stratified sample. It materially simplifies the necessary arithmetic and it brings the analysis in harmony with the theory of small samples associated with "Student's" work published in 1908.

6. The opportunity has been taken to illustrate analysis of variance with simple and straightforward sampling data. The method has been employed to minimize the controllable heterogeneous elements of the corn yield estimates of Iowa for 1930.

7. By reducing and interpreting the yield estimates with analysis of variance technique it was shown that not only is the statistical significance of the mean of the sample enhanced, but also, the reliability of means of the several sub-samples or strata, are improved.

8. When it is desirable to isolate more than one heterogeneous element it is essential to plan the internal arrangement of the sample so that the results may be interpreted by analysis of variance.

9. The method provides a rigorous mathematical procedure by which one can test suspected elements for heterogeneity or homogeneity. If such elements show variations significantly different from the residual variation (sampling error) they can be recognized in the future selection of samples. The method therefore paves the way for the stratification of samples far beyond mere geographical distribution.

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PUBLIC UTILITY CONTROL OF MILK IN WINNIPEG

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Students of the milk marketing problem may recall that milk has been "sick" before now. They may remember also that during the war and during the years immediately following the war, the price of milk was the subject of exhaustive study by government commissions and college investigators. It is interesting to note that many of these reports suggested some form of public utility control of milk. Dr. Clyde L. King, in his book "The Price of Milk" analyzes both the legal and practical aspect of such control and advances it as one solution of both acute and chronic distress in the milk industry. Evidently the acute symptoms of distress had disappeared before the political doctors could get around to see the patient.

An attempt has been made by the Government of the Province of Manitoba to control the marketing of milk in the City of Winnipeg by the device of declaring as a public utility, "any plant, premises, equipment, service, or organization for the production, handling, bottling, furnishing, delivery, keeping for sale, or the sale of milk, including products thereof in a liquid form."[2]

It is the purpose of this article to outline, (1) the causes and events leading to control, (2) the method and theory of control, (3) the results of control.

The Causes and Events Leading to Control

For at least ten years previous to the summer of 1931 the Winnipeg milk situation had been void of any serious problems. Distributors and producers had been working together with more harmony than discord and the simplest form of basic-surplus price plans had been mutually acceptable. Apart from winter and summer changes the prices of milk were unusually stable over this period of time. Too stable, in fact, for their very rigidity after the general price decline of 1930, induced new milk shippers and milk distributors to enter the market in 1931. There was nothing to stop them for there was no city milk ordinance which

[1] The writer wishes to acknowledge the assistance, in the preparation of this paper, of W. R. Cottingham, K.C., Chairman of The Municipal and Public Utilities Board, Manitoba.

[2] Statutes of Manitoba, Chap. 30—An Act to Amend "The Municipal and Public Utility Board."

would exclude anyone from shipping milk to a pasteurizing plant. The Milk Producers' Association in the past had been more interested in competition from peddlers of raw milk and were agitating for compulsory pasteurization. The question of market exclusion within their own ranks was never considered until a flood of "uncontrolled milk," in the summer and fall of 1931, undermined their relations with the distributors. The two largest distributors had been bargaining with the Producers' Association, but one of the chain stores set up a pasteurizing plant and three new distributors entered the field and these all refused to deal with the Producers' Association. The chain stores were in a particularly strong position because they could avoid the surplus problem, pick their milk shippers, pay these shippers 100 per cent fluid milk price, and avoid most of the delivery costs. Thus they could say and did say that they paid the highest price to farmers and sold at the lowest price to consumers. Under such circumstances milk prices fell from $1.75 a hundred to less than $1.00 to producers and from 10 cents a quart to, in same cases, 5 cents a quart retail. When all attempts at arbitration between the organized producers and the distributors failed, the Producers' Association asked the Co-operative Marketing Board of the Province to study the milk problem and to suggest plans whereby the situation might be improved. The writer was instructed by the Marketing Board to make a study of the milk situation in Canada and the United States with particular reference to specific plans which had in some measure proved adequate to meet conditions similar to those existing in the Winnipeg area. In brief the writer's report suggested that the Winnipeg situation was not unique and that only two plans were apparently standing up elsewhere under these circumstances. These were (1) the plan of market exclusion by means of rigidly enforced sanitary regulations covering the production of fluid milk and, (2) price control by means of civic or state regulating bodies as had been suggested many times before but only recently tried and proven satisfactory in Portland, Oregon. The Winnipeg civic authorities did not take kindly to the suggestion of remodelling their "milk code" and the producers therefore turned to the provincial government for a solution and they asked the legislature to declare that milk distribution was a public utility.

This was done in May 1932 and the Municipal and Public Utility Board was instructed and empowered as follows:[3]

[3] Extracted from the Act.

107A (1) The Board shall have jurisdiction, upon its own initiative, or upon complaint in writing, to inquire into any matter relating to the production, supply, distribution or sale of milk.

(2) If by such inquiry it is found that the milk supply in any part of the province is likely to be interrupted or impaired in quality to an extent affecting the public health or convenience or the distribution, sale or disposal is subject to discriminatory, unfair and unwarranted competition, and that measures should be adopted to insure the continuity of adequate milk supply, the Board shall have power to make regulations or orders deemed necessary in the public interest, and

(a) to prescribe the area or areas, whether bounded municipally or otherwise, in which such regulations shall have effect;

(b) to require all persons who distribute, keep for sale or sell milk in any such area to be authorized by the Board so to do, and to fix the terms and conditions upon which such authorization may be obtained;

(c) to prescribe the terms and conditions upon which milk may be received, handled, stored, and delivered, kept for sale or sold in any such area;

(d) to classify milk producers and distributors or other persons keeping milk for sale or selling milk;

(e) when the Board's finding is based in part on conditions due to discriminatory, unfair or unwarranted competition, to approve or establish from time to time temporary schedules of rates at which milk shall be supplied by the respective classes, having regard primarily to the interests of the public and to the continuity and quality of supply, and in so proceeding the Board shall not be bound by any rule of law or public utility practice to see that any ratio of return is provided on any plant, equipment or investment;

(f) to assess upon and collect from persons producing, distributing or selling milk in any such area such sums as are deemed necessary to be expended, or have been expended, in carrying out the provisions of this section. Every such assessment shall be a debt due to the Crown.

(3) This section is enacted for emergency purposes, shall be construed as such, and except for the recovery of unpaid assessments, shall cease to have effect on the twentieth day after the opening of the next session of the Legislature.

During the 1933 session of the Legislature the above provisions were made operative until March 1934, and it was further provided that the Board shall have power to license those engaged in the processing or distributing of milk, and also refuse a license where, in its opinion, the public convenience or health so requires. Paragraph (e) of subsection (2) of section 107A (see above) was amended by deleting from the beginning thereof the words "where the Board's finding is based in part on condi-

tions due to discriminatory, unfair, or unwarranted competition" and substituting therefor "Notwithstanding anything herein contained."

It will be observed that, (1) the legislation is temporary, (2) that it is enacted for emergency purposes only, (3) that an emergency is construed, or at least implied as the interruption or impairment in quality to an extent affecting public health or convenience, and (4) that by the recent amendments prices may be approved or established on general grounds rather than on account of unfair or discriminating trade practices and (5) that the Board has power to control the number of distributors operating in the area.

As mentioned above, the legislation was passed in May and by the end of June it was apparent that conditions affecting milk production were very different from the previous year. Rainfall had been deficient for the preceding two years; feed was becoming scarce and high priced; pastures were failing; and a plague of grasshoppers was seriously reducing the pastures that were left. The producers claimed that these conditions, combined with low prices, had brought on an emergency as implied under the act and made complaint to the Board.

Late in July 1932 the Board held an inquiry (under 107A (1) of the Act) and tried to procure evidence showing that the milk supply was endangered. Statistical evidence of the supply situation was not available. The Association called witnesses who presented information covering their own farms but the number of witnesses was small and in most cases their records were far from complete. The Board after spending some days in vain attempt to procure adequate data on costs and quantities produced suggested an intermission during which time the producers and distributors should again try to agree and in the event of a compromise decision being required the Board would reconvene and act as an arbitrator.

The distributors and producers did not come anywhere near agreement, particularly as the chain stores would not even discuss the matter. In the meantime the Board had gone over the evidence submitted and had decided that an emergency did exist and decided further that it would reopen the inquiry on this basis and discuss at what level prices should be established by the Board. At this hearing the chain stores stated that they would not arbitrate a price, but were agreeable to having the Board force them to set prices.

It should be apparent to the reader, as it was to the writer

during the hearings, that under the circumstances outlined above there was no other way of bringing order into a most chaotic situation than for the Board to exercise compulsory power. The Board told all parties, time and time again, that they would rather act in the manner of a board of conciliation rather than in the way they were eventually forced to act. Having been forced to act as they did, they immediately put into operation regulations which left no chance of their orders being evaded.

The Method and Theory of Control

Price Fixing.—The Board has accepted the principle that their compulsory price fixing powers shall only be exercised when producers and distributors fail to agree and when this failure to agree endangers the milk supply. This implies that the Board may in the future act in the interests of consumers if the prices agreed on, by deliberation outside the Board, are considered unduly high. At all times the Board is open to consumers, producers, or distributors who may make application to show that the existing price should be changed. Up to the present the Board's method of determining a fair price cannot claim any scientific validity, whatever that may mean. The Board had no detailed cost of production figures before it and after careful studies of other commissions which attempted to fix prices on this basis it is doubtful if the Board was impressed with the possibilities of such a method. The Board assumes as a working hypothesis that between the upper limits of price which producers demand and the lower limits which distributors offer, lies a price area where other factors, particularly the general price level, and the relation thereto of milk prices in the past and at the present, provide a guide to fixing a compromise price which will permit supply and demand to operate without undue disturbance. Having once set a price or prices the Board requires the distributors to file periodically a record of all receipts and sales of milk. In this way the quantitative factors of demand and supply and the changes in total demand are known and in the future it is hoped that the effect of price changes on supply and demand can be measured and thus provide a more accurate knowledge upon which the Board's decision can be based. In the past none of this information was available which allowed the distributors to claim that demand was falling off and that prices should be lowered, and producers to claim that supplies were endangered and prices should be raised. Neither party produced factual data to support its claims.

Maintenance of Prices.—An order of the Board fixed the price paid producers and the prices of milk sold in bottles, in bulk wholesale and of cream sold in bottles, on a butter fat price basis calculated so as to take care of the then prospective upward trend in cream prices. Transactions between creameries and distributing plants were exempted, as were also governmental, municipal and institutional arrangements. The muncipalities later contracted with the distributors for milk for relief purposes at eight cents per quart. The practice of featuring milk as an advertising "leader" was prohibited.

Winnipeg distributors get their supplies from shippers on a basic-surplus arrangement. Individual quotas are based on the general average shipments of the producer during the preceding twelve months. A subsequent order prescribed that the maximum quota settlements of each distributor should not be less than the quantity of milk sold by him in that month, thus assuring the producer that milk sold by him as surplus was not as market milk.

A further order fixed the costs of administration. These amount to 2 cents per hundredweight. The distributor collects 1 cent per hundredweight from the producer which he pays to the Board along with 1 cent per hundredweight on all his sales of fluid milk. Three inspectors and a stenographer supervise the operation of the distributors in the metropolitan area. Distributors who produce their own milk, still supply one-third of the Winnipeg market. They too were covered by the orders, but so far have borne none of the cost of administration. Over 1200 stores are now selling milk and their records are supervised. The store pays the distributor 7½ cents per quart, giving it a spread of ½ cent which is ground of complaint yet to be smoothed out.

Under the public utility control we must have an effective way of restricting the men who wish to enter the milk distributing business, particularly the pasteurization end. Some will quarrel with that at once, but here is the reason and it is in accord with the generally accepted principles of public utility regulation. If you have in your community twice as many pasteurizing plants and twice as many delivery wagons and other facilities as are necessary to carry on the distribution of milk in the community, and all are going to be supported, the community is going to pay a higher price for its milk; that is all there is to it. In the end, public utility control is planned economy to enable the consumer to get his service or product at the lowest possible price, and for that reason the fixing of rates, which the public

sees as the chief work of a public utility commission, is but incidental and secondary. The real task is to see that the total investment is not unduly great, that the accounts are properly kept, that plant and equipment are adequately maintained to render the service without impairment in quantity or quality and that the managerial functions are properly performed. In this task, at least, we can see a public benefit resulting from public utility control of the marketing of milk.

The original theory covering public utilities was that they were businesses which were "natural" monopolies and that through a lack of continuous and complete competition they were in a position to injure the consumer and their regulation was, therefore, necessary in the public interest. From the regulation of a "natural" monopoly it was a short step to the regulation of certain services legislatively by treating them as monopolies whether they were monopolistic or not, because the public interest demanded that they be controlled as if they were monopolies. The Canada Grain Act is a good example of this type of legislation; taxicab and motor carrier regulations represent another. If our statute is constitutionally sound, as it appears to be, and validly enables us to treat market milk as a public utility, it must be by an extension of the same principle. In other words, the very necessity of the case requires that public authority should intervene for the protection of the public as a whole, because there is nothing monopolistic, inherently, in any phase of our milk industry. It is probably one of the oldest of occupations and nothing but the complexities of our modern urban and economic life could have led to its regulation in any form. Heretofore this regulation has moved along the lines of public health. Its extension to control upon economic lines is a development consistent with the views of a large section of public opinion. The doctrine of public utility control in its origin was advanced by "liberalism" or radicalism," it came from the "left," which, often enough, is prone to forget its own offspring, and its application to the market milk industry can only be successful if it is a real control, that is, it must extend to production as well as to distribution. Whether it should or could go further than what has already been done in other cities by means of sanitary regulations we are not in a position to say. That our individualistic farmers, to say nothing of distributors, will not support it if and when it operates against them we have no hesitance in prophesying. The writer frankly admits that he has always had some difficulty in seeing just where

the marketing of milk came into the public utility concept, unless it, as a public necessity, imports so much of public interest that public supervision on economic lines is justified, and it is only by the successful working out of our jurisdiction in these few months that many have been won around to see it as a possible development.

In public utility control of the marketing of milk, and particularly of the prices of milk, the distinction between that and other regulative methods lies in this, that the price is fixed all along the line. Other incidents of control arise, for example, the principles on which the distributors should regulate the quantities they receive from each shipper and the kind and number of their shippers.

There are at least two constitutional points involved in this legislation. In the first place, is it within the power of the legislature of a province to declare that an industry shall be a public utility and subject to that type of regulation? This is highly important. Its implications may affect every private business because of the possibility of the state asserting itself over its operations if the principle is constitutionally sound.

In the United States this question has been before the Supreme Court on several occasions. This high tribunal, having the guardianship of the American Constitution in its custody, has laid down definite principles. A public utility must be a business in which the public is affected with interest, in which interest some regulation on the public behalf is justified. The legislature of a state has no power to require the owner of an otherwise private business to devote his business to public uses.

The typical American public utility is a business deemed by law to be affected with public interest and in need of some regulation in that interest when the control ordinarily performed by competition is wanting. A Federal Appeal Court denied the attempt of the State of Oklahoma to make the ice-making business a public utility, in the following words: "It is our conclusion that, while ice is an essential commodity, there is both potential and actual competition in such business sufficient to afford adequate protection to the public from arbitrary treatment and excessive prices." This decision was affirmed by the United States Supreme Court, March 21st, 1932 (Public Utility Reports, 1932B, page 433). This, by the way, was the case in which Justice Brandeis delivered his now famous judgment where he dissented from the decision of the majority and pointed out the contrast

between conditions today and those of other depressions—"the economic emergencies of the past were incidents of scarcity," whereas "the people of the United States are now confronted with an emergency more serious than war. Misery is widespread, in a time not of scarcity, but of over-abundance."

Whether the marketing of milk in the United States can constitutionally be made a public utility we will leave to the American courts. Notwithstanding this decision the field seems to be extending and now includes cotton gins, grain elevators, abbatoirs, stock yards and other industries related to agriculture.

We have been unable to find any Canadian decision on the point. Under our constitution, the B.N.A. Act, the provinces have jurisdiction over civil rights and property, and we would say that so long as the marketing of milk is kept within that heading it can be regulated by provincial statute. The provinces have long regulated public utilities and fixed the prices they should charge for their services. It follows, then, that once a province undertakes to regulate an industry in respect of its contracts, as in the case of the insurance companies which are regulated through their contractual obligations (their policies) it can also provide for that contractual element known as the price. Thus, it is our opinion, that legislation of this type is constitutionally sound. The reader must remember that in Canada once a power has been found to lie within the jurisdiction of a province there is practically no limit upon the legislature of the province in the reasonable exercise of that power.

The Interests of the Consumer

Our common law legal system operates substantially in favor of the consumer. You cannot make contracts that are in restraint of trade; the chances are the courts will not support arrangements restricting competition unduly; and legislative and civic bodies ordinarily will not interfere in the milk business, or, in any other business unless the consumer is being made to pay too much or is otherwise unfairly treated. Practically all of our legalistic machinery for regulating business, outside of those larger phases of national politics with which we are not now concerned, is devised to protect the consumer. Monopolies tend to charge the consumer too much and that is why in our hearts, as well as in our legal system, there is a definite opposition to their encouragement. Where does the consumer come in when, for example, we authorize an increase in street car fares? Take a vote of the

riders and few would support the proposal. Yet there is a principle and it has to be faced. If the service is to be preserved, and the business maintained on a sound basis, revenue has to be found to do so, and it should come primarily from the people who use the service. This may be applied to the distribution of milk under a situation such as we had here in Winnipeg last summer when evidence sworn to before the Board was that conditions, if left as they were, would bring a serious failure of market milk supply in Winnipeg during the fall and winter months. It was falling off very rapidly in July and in the early part of August. If there had been a shortage, then the consumer, or the consuming public, would have been forced to go short on milk or to pay exorbitant prices to get it. It would have to be brought in from other places, with the added cost of transportation; while in the meantime, assuming that we think only of the consumer, the production of market milk and the consumers' source of supply around Winnipeg would have been destroyed for years to come.

Results of Control

Public utility control of milk in Winnipeg is frankly an experiment. So far it has received the support of distributors, producers and the public. To expect that these groups are completely satisfied with the manner in which control is exercised would be expecting too much of human nature. Producers would like to see the Board control dealers' margins. This is always a vexing question in the producer's mind: Why the difference between what he gets and what the consumer pays? The Board's order was designed to pass on to the producer the increased price borne by the consumer. The result has been the establishment of distributors' spreads on the lowest level obtaining in Canada or possibly elsewhere on the continent. Monthly records now show that the distributors are operating on spreads running according to the plant from 4.51 to 5.13 cents per unit (Imperial measure). On these returns the newer plants are paying capital, depreciation and operating costs, but the older ones with higher capitalization are not. The regular distributors would like to see chain store prices raised. We gather the impression that chain stores would like to see a return to the good old days when "rugged individualism" prevailed. Generally speaking, however, it cannot be denied that the milk industry in Winnipeg has been stabilized.

There is another question which must be answered. If the

Board continues in the control of the marketing of milk what will happen the Producers' Association? There should be no cause for concern here. A Board which functions, as our does, semi-judicially in strictly economic and non-political fields, should have before it the two sides to every question, and the Producers' Association can function in the first place to maintain contact amongst the individual members, and in the second place to appear as litigants, representing one side. We do not see how the community can be supplied with milk continually, without impairment of quality or quantity, unless an effective Milk Producers' Association is in existence.

We have been very fortunate in our venture. The geographical and artificial boundaries of the milk shed have helped; the co-operation of all concerned has been invaluable; the men we were able to put to work as inspectors are men drawn from the industry, experienced in its ways and acquainted with and respected by its personnel.

Appendix

EXTRACT
FROM ORDER NO. 635
MUNICIPAL AND PUBLIC UTILITY BOARD
IN THE MATTER OF THE MILK SUPPLY
OF GREATER WINNIPEG

1. Milk producers and distributors are hereby classified as

CLASS A—Those who buy, pasteurize, process and/or have milk for resale as fluid milk.

CLASS B—Those who sell milk produced by themselves by direct delivery to consumers (producer-distributors).

CLASS C—Stores that sell milk or keep it for sale.

CLASS D—Milk producers or shippers.

2. The prices in the following schedules of rates at which milk shall be purchased and sold in Greater Winnipeg are hereby authorized, approved and directed to be effective.

A. Schedule of Prices to Milk Producers.

To be paid to producers by milk distributors (Class A, above) and others who purchase milk in bulk direct from producers, for distribution as fluid milk—a minimum price equal to One Dollar and Fifty-five cents ($1.55) per hundredweight (3.5 standard) f.o.b. plant, in quantities based on contract or quota arrangements between distributors and producers.

B. Schedule of Distributors' Prices:

(a) Fluid Milk to Consumers:

To be charged to purchasers of fluid milk by the bottle:

Delivered at consumers' premises, whether by wagon or otherwise:

Per quart—ten cents.

Per pint—six cents.
Per half pint (to schools only)—three cents.
Sold by stores for cash, to be carried away by the purchaser:
Per quart—eight cents.
Per pint—(minimum—four and one-half cents).
(general—five cents).
Subject to contracts in favor of hospitals and governmental, municipal, charitable and/or relief institutions.

(b) Fluid Milk to Stores:
To be charged by distributors to stores and the operators thereof purchasing milk for resale:
Per quart bottle—seven and one-half cents.
Per pint bottle—four and one-half cents.

(c) Fluid Milk in Quantities:
Bulk, per gallon—twenty-five cents.
In bottles—
Per quart—seven and one-half cents.
Per pint—four and one-half cents.
Per half-pint—two and one-half cents.

3. The following is approved as the schedule of prices of cream, applicable in Greater Winnipeg.

(a) Delivered at consumers' premises, whether by wagon or otherwise—per one-half pint bottle:
Coffee or 18% cream—twelve cents.
Whipping or 32% cream—twenty cents.

(b) Cream sold at stores, to be carried away by purchasers for cash—per half pint bottle:
Coffee or 18% cream—nine cents.
Whipping or 32% cream—fifteen cents.

(c) To stores for resale:
Per half pint bottle coffee cream—eight and one-half cents.
Per half pint bottle whipping cream—fourteen cents.

(d) In quantities or by wholesale:
18%—per quart bottle—thirty-five cents.
per gallon (bulk)—one dollar and ten cents.
25% cream—per quart bottle—forty cents.
per gallon (bulk)—one dollar and thirty cents.
32% cream—per quart bottle—fifty cents.
per gallon (bulk)—one dollar and sixty cents.
All cream prices subject to variations in price of butter-fat as against butter-fat price now obtaining.

4. Milk and cream shall be kept for sale and sold in Greater Winnipeg, subject to the following conditions:

(a) That every person, firm or corporation producing, handling, bottling, furnishing, delivering, keeping for sale or selling milk or cream, do so according to law and the provisions of municipal by-laws, and to such registrations, permits or licenses as this Board may hereafter lawfully require.

(b) That offers to sell or the sale of milk or cream shall not be made in combination with offers to sell or the sale of any other commodity.

5. Every person, firm or corporation who purchases fluid milk from a producer or

shipper, for resale as fluid milk in Greater Winnipeg, shall, on or before the seventh day of each calendar month, mail or deliver to the Secretary of this Board a return showing for the last preceding calendar month the following:

(a) The quantity in pounds of fluid milk so purchased by him, and delivered to him at his plant in Greater Winnipeg.

(b) The amount paid for the same separated as to percentages of contract or quota quantities purchased, if so separated, and for surplus milk, if any;

(c) The quantity of milk so purchased, which was sold by him as fluid milk; and

(d) The quantity of milk so purchased disposed of by him as surplus milk or disposed of otherwise than as fluid milk.

Such returns are to be kept for the confidential use of the Board.

6. This order shall not apply:

(a) to transactions between creameries and milk pasteurizing plants in Greater Winnipeg;

(b) to sales of buttermilk, skimmed milk, or other milk products not specifically referred to herein; or

(c) to milk in bottles bearing caps marked "certified" where such are issued by authority of the Board of Health.

7. This order shall apply to all purchases of fluid milk for resale as fluid milk and to the sale of fluid milk in the area of Greater Winnipeg, which, for the purposes of this and subsequent orders, if any, comprises the Cities of Winnipeg and St. Boniface, the Town of Tuxedo, the Village of Brooklands and the Rural Municipalities of St. James, St. Vital, Fort Garry, West Kildonan and East Kildonan, excepting the non-urban portions of such rural municipalities.

8. Pursuant to section 127 of The Municipal and Public Utility Board Act, no change in the prices hereby authorized shall be made except by approval of this Board, and any person desiring to vary any of the said prices shall, before doing so, file notice with the Secretary of the Board of his desire to do so, setting out the changes proposed and the reason for the same, which shall be supported at a hearing of the parties interested after due notice.

THE AGRICULTURAL PROGRAM OF FASCIST ITALY[1]

N. W. Hazan
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Italy is essentially an agricultural country, although not without important industries. Within the relatively small area of the country a wide diversity of soil, elevation, rainfall, and temperature prevails. Social and economic conditions likewise vary greatly from place to place. Because of these widely varied physical, social, and economic conditions, the agriculture of Italy covers a range as wide as that covered by the agriculture of Europe. The kingdom as a whole, including the large islands of Sicily and Sardinia, has an area of 119,000 square miles and a population of more than 41 million inhabitants (one-fifth smaller in area than the state of California, with a population more than seven times as large). In population Italy ranks third of all continental European countries, being surpassed only by Russia and Germany. Although the climate is in general favorable to the production of many agricultural commodities, the land is swampy in many regions of the country. Thus, from the time of the Romans to our present day, Italy has suffered from malaria on account of the swamps of the Po River Valley, the Roman countryside, the province of Venetia, and most of southern Italy.

In order to grasp fully the meaning of the present Italian agricultural situation, it is necessary to have in mind one of the main problems of Italy's economic life, i.e. its excess of population. Toward the end of the nineteenth century (1884), at the beginning of the twentieth (1903), and again a decade ago (1919-1922), Italy was shaken by very serious agrarian revolts. The fundamental economic cause of these movements was the excess of population. The great number of its inhabitants which, in the field of foreign policy, makes the pride and strength of Italy, arouses in the social life of the country some serious and difficult problems. A soil of limited area has to support a population which in less than fifty years (1881-1929) has increased from 28 to 41 million people. Moreover, southern Italy, which contributes very largely to this increase of population, is exclusively agricultural. There are no important industries in that part of the country to utilize the unemployed hands. There comes a time

[1] Only the broad aspects of Italy's experiment in agriculture are dealt with in this article. Many of the statistics are taken from the cited Italian sources and are presented without any comment as to their reliability.

when the excess of population brings a crisis. It is this phenomenon which Italy has experienced for the last fifteen years, whereas since the end of the last century the country has lived in a condition of latent crisis. As long as there exists some means of relieving the pressure of the excess of population and thus maintaining a balance between the factors of production, calm reigns and life seems normal. But when, for one reason or another, the doors are closed to the flow of this excess of population, the crisis becomes more pronounced, agrarian agitations start, and the movement goes on amplifying itself continuously. In this regard, Italy resembles its volcanoes. The lava boils rumblingly for several years, then suddenly escapes to the outside when the unstable equilibrium of forces is destroyed by a considerable interior pressure. The soil of the Italian peninsula is under such a demographic pressure that the least variation in the latter results in very grave crises. Before the World War, emigration to foreign lands was the remedy that existed for this socially unfavorable situation. One can scarcely conceive what that emigration meant to Italy in pre-war days unless a few figures are recalled. From 1909 to 1913 net emigration reached an annual average of 501,735 persons (679,000 actually left their country while 177,265 old emigrants came back). In the year 1913 alone, net emigration attained 683,620 persons (actual emigration amounting to 872,598 and repatriation to 188,978).[2] This meant that 19.19 persons for every thousand inhabitants left the Italian ports for other lands during that year; this is the highest figure recorded in the history of Italian emigration. Of those who left in that year, over 500,000 went to North and South America. It was only at this cost that Italy could enjoy social tranquility at home. During the World War, however, not only was emigration stopped, but many of those who had left their country were recalled to defend it. When, after the War, Italians sought to migrate, some countries had closed their doors, while others were not ready to receive new immigrants. However, in 1919 and 1920, the question of the emigration of Italian workers was settled by diplomatic conventions. During the years 1921 and 1922 net emigration reached an annual figure of 135,000 (284,000 representing gross emigration and 149,000 repatriation).[3]

From the unification of the Italian kingdom (1870) until 1927,

[2] Direzione Generale della Statistica e del Lavoro, *Annuario Statistico Italiano*, Seconda Serie, Vol. IV, Anno 1914, pp. 67, 68, and 73.

[3] Instituto Centrale di Statistica del Regno d'Italia, *Annuario Statistico Italiano*, Anno 1930, Terza Serie, Vol. IV, p. 50.

emigration was looked upon as the beneficent means of relieving the country of the pressure due to a continually increasing population. However, since 1927 it has been considered an evil. The fascist government, which aims to bring the Italian population to sixty millions during the second half of this century, considers emigration an "evil" which, "in return for a handful of gold sent home later by the emigrant," robs Italy, "from the material standpoint, of all that she has spent on feeding and educating him and turning him into a producer; from the military standpoint, of a soldier; and from the population standpoint, of an element of youth and strength that will fertilize foreign lands and give children to a foreign country."[4] The fascist government's new emigration policy, inaugurated in 1927, tends on the one hand to restrict all forms of emigration that may deprive the country of man power, and, on the other hand, through a systematic propaganda, to keep up a strong national feeling among Italians already living abroad and thus prevent them from being definitely lost to their mother country. As a result of this new policy, Italian emigration dropped from an annual figure of 130,710 for the period 1921-1927 (gross emigration 305,140 and repatriation 174,430) to a yearly figure of 79,000 for the period 1928-1930 (gross emigration 246,666 and repatriation 167,666).[5] A glance at the composition and geographic origin of the Italian emigration shows us that while all occupations are represented among the emigrants, agriculture supplies the largest group (33 per cent from 1901 to 1914, and 27 per cent after the World War). Next in importance come the industrial and skilled workers (representing 20 per cent of the post-war total as compared to 11 per cent for the 1901-1914 period), followed by the general and day laborers (at present 14 per cent of the total as compared to 30 per cent in the same pre-war years).[6] While the majority of the industrial workers come from northern Italy and usually migrate for short periods, being engaged in specific jobs in neighboring countries, agricultural workers and general day laborers come from all parts of the country (especially from southern Italy), and leave for distant countries without usually contemplating return. One rarely encounters in such

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[4] Camera dei Deputati: *Atti parlementari*, 27th Legislature, 1st Session, Sitting of May 26, 1927. (As reproduced by Dr. Attilio Oblath in *International Labour Review* of June, 1931, Vol. XXIII, No. 6, p. 806.)

[5] Instituto Centrale di Statistica del Regno d'Italia, *Annuario Statistico Italiano*, Anno 1931, Terza Serie, Vol. V, p. 56.

[6] Dr. Attilio Oblath, *Italian Emigration and Colonisation Policy*. International Labour Review, Vol. XXIII, No. 6, June, 1931, p. 824.

a clear-cut manner the influence of the excess of population on the life of a country. This phenomenon occurred in England in the nineteenth century. Italy is now giving us a newer example.

Although one often hears in Italy the expression "rationalization of agricultural production" by which Italians mean: increase of production; betterment of the quality of the product; adaptation of quality and quantity to consumption; and diminution of cost of production, the actual agricultural policy of the fascist régime could easily be divided into two general parts:

(1) Wholesale land reclamation and soil improvement (*la bonificazione integrale*);

(2) Intensification of production and the development of agricultural exports, agricultural cooperative associations, and agricultural education. Whereas both form the main body of the present agricultural program of Italy, the *bonificazione integrale* is by far the most pressing problem and the one which is of greatest interest to the government as well as the masses.

Land Reclamation and Soil Improvement. Since the beginning of this century Italy has had to import considerable quantities of agricultural commodities. From the very outset Mussolini, himself born and reared on the farm, sought to help the farmer in order to strengthen his political power. Since the "March on Rome" (October, 1922), the fascist régime had endeavored to give its political policy an agricultural and rural color. Agriculture, which was experiencing very trying times resulting from the exigencies of the World War (lack of labor power, devastation of invaded regions, revolutionary disorders in 1919-1922, etc.) was taken quickly as the center of action of the new government. At present the government considers as the most essential and decisive factor of all its social and economic policy the possibility of giving agriculture its maximum efficiency. Moreover, following a militaristic political ambition and a mercantilistic economic policy, Mussolini is encouraging the increase of Italy's population. On account of the fascist policy of keeping the Italians in Italy and the increasing immigration restrictions in almost every country, the growing masses of Italy cannot and do not know where to migrate. Mussolini's solution, however, is that of increasing the cultivated area of Italy. The program of *bonificazione* seems to answer a pressing human need. It is estimated that there are in Italy, on the peninsula as well as on the islands, some nine millions of acres which can be reclaimed, improved, and made productive, and Mussolini is resolved to see them produce at any cost.

Land reclamation is not a new idea in Italy. Though some drainage and reclamation work had been going on in the Italian peninsula for centuries, systematic and large scale improvement schemes began in the year 1882. But on the whole those early works were for sanitary purposes. The regulations regarded the problem as a simple question of drainage and embankment of marshy areas for the preservation of the public health. It was not until the end of 1923 (Royal Decree of December 30, 1923, No. 3256) that the rôle of the government was broadened to include direct and indirect assistance not only for sanitary purposes but for economic reasons as well. To the drainage of marshy lands were added irrigation works, road construction, works to provide drinking water, etc. This decree divided the soil improvement program into two separate sections. First, the improvements of the first category (*bonifica di prima categoria*) in which the combined sanitary and economic advantages are mainly in the social interest and which are carried out by the state. Second, the improvements of the second category (*bonifica di seconda categoria*) include all those carried out by individuals, although the state may assist when public health is concerned or when large capital expenditures are involved. Following this decree, the law of May 18, 1924, No. 753, on "land development schemes of public interest" (*trasformazioni fondiarie di pubblico interesse*) widened the field of state intervention and recognized the "economic-agrarian" aim as the principal object of the land reclamation program of Italy. Thus, besides the redemption of the marshy areas from the economic and sanitary standpoints, this law proposed to secure the intensification of production in those regions where waste lands exist, whether the cause of such conditions be physical or economic. Finally, this program of land reclamation and soil improvement received its greatest impetus after the passage of the law of December 24, 1928, the so-called Mussolini Law. This law was designed to increase, as much as possible, efficiency in Italian agriculture and related activities, such as land drainage and sanitation, irrigation, and forestry.

The financial program of the Mussolini Law of December 24, 1928, assures the land reclamation and soil improvement schemes, for a period of 14 years, of more than $350,000,000[7] of which the government's share will be $215,000,000. The operations are to cover an area of 9,035,260 acres (or about 12.8 per cent of the area now under cultivation or forests in Italy, which

[7] Conversion of the Italian lira into dollars has been made on the basis of 20 paper lire to the dollar.

is in all 70,395,000 acres).[8] The following stipulations are the basis of the financial program of these works:[9]

(1) The water power works of the first and second categories (of betterments) as well as the irrigation of lands outside these limits, especially in southern and insular Italy, will be undertaken in the course of fifteen years beginning July 1, 1929, and ending June 30, 1944. These works are scheduled to cost $240,000,000 and will be completed by June 30, 1944.

(2) Works on rural aqueducts will require seven years, from July 1, 1930, to June 30, 1937, at a total cost of $10,000,000.

(3) Rural communities will be erected in the course of eight years, from July 1, 1930, to June 30, 1938, at a cost of $25,000,000.

(4) Irrigation works in northern and central Italy will be undertaken during the same period of eight years at a cost of $25,000,000.

(5) Rural roads and works destined to assure the supply of drinking water will cost $50,000,000, and will be undertaken during the fourteen-year period July 1, 1930, to June 30, 1944.

In order not to burden the Italian government's budget and to avoid the dangerous consequences of more foreign loans, this financial aid of the state ($215,000,000 of a total estimated cost of $350,000,000) is provided as a series of annual payments running over a period not to exceed fifty years. The rate of the government's subsidy varies from 40 to 60 per cent of the cost of reclamation; in southern Italy, however, it reaches 75 per cent of the costs. In that part of the country the provincial government is compelled to participate to the extent of 12 per cent, while the remaining portion of 13 per cent is to be paid by local "syndicates" or "consortia." These syndicates are composed mainly of landowners whose estates are in need of improvement, and who work together under the guidance and with the help of the government. The condition of the land to be reclaimed or improved is determined by the government's department of Civil Engineering, the report of which enables the governmental authorities to settle the percentage of state aid to be given. The extent of participation of the national and provincial governments and of the syndicate of landowners is specified in the contract entered into between the three parties. The "annuities" of the national and provincial governments are calculated with an interest rate of 1 per cent above the rate established by the Bank of

[8] G. C. *The General Scheme of Land Improvement in Italy.* International Review of Agriculture, Part II, Monthly Bulletin of Agricultural Economics and Sociology, Year XX, No. 4, April, 1929, p. 172.

[9] Dr. Ernesto Cianci, *La bataille pour le blé et la mise en valeur intégrale de la terre en Italie,* Revue Economique Internationale. 24th year, Vol. 1, No. 2, February, 1932, p. 355.

Deposits and Loans for ordinary loans. The syndicates or consortia take the notes of the national and provincial governments and discount them at one of the following financial institutions especially designated to finance reclamation works: Bank of Deposits and Loans, National Institute of Insurance, National Bank of Social Insurance, National Institute of Credit to Cooperatives, and savings banks. In the case of improvement work undertaken by private individuals on their own estates (as contrasted with new schemes started by syndicates or consortia), the government aid takes the form of long-term loans at a reduced interest rate.

It is interesting to note that this financial program inaugurated by the government refers mainly to such works as drainage and irrigation, pumping stations, rural roads, etc., which are only part of the wholesale land reclamation and soil improvement policy of the fascist régimé. The agricultural improvement program involving land clearing, livestock production, funds for farming operations, etc., is left to the landowners to work out under the guidance of the state. This fundamental phase of the whole experiment, which is very difficult to organize and so uncertain in its results, must, however, wait for the reclamation schemes to be well under way before being extensively undertaken.[10]

It may be well to mention here something about the ambitious agricultural projects of the fascist government in its colonies. To the political and military aspects from which the Italian colonies of Tripolitania and Cyrenaica in North Africa and Somaliland and Eritrea in East Africa were usually viewed, Mussolini is adding those of emigration and agriculture. With these colonies devoid of any underground resources, it is on agriculture that the fascist government is relying to have these regions absorb Italian emigration. Tripolitania and Cyrenaica, with their natural features and their climates similar to those of southern Italy, offer some possibilities for agricultural settlers from the home country. It is doubtful, however, if much could be done in

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[10] Thus, the above mentioned amount of $350,000,000 represents only part of the costs, that part involving large reclamation works and improvements of general nature. The working out of the whole agricultural program of the régime may require about three times as much, or $1,000,000,000.

"The financial plan on which the Mussolini Law is based provides for $350,000,000 for works which must be achieved in a period of fourteen years. But this answers only part of the needs.

"Account has not been taken, in this evaluation, of the works which the State will have to execute directly as well as through concessionaries. Also, no account has been taken of the leveling works, as well as the numerous works of private interest required by the individual estates and which are not less necessary than the large public works and those concerning the consortia. It is for these reasons that it is perhaps necessary to treble the figure (of $350,000,000)."

Part of the speech made by Giacomo Acerbo, Italian Secretary of Agriculture and Forests, in the Chamber of Deputies on April 9, 1930.

Somaliland and Eritrea. Meanwhile, the fascist government has launched an extensive campaign for the settlement of Italian agricultural workers in these colonies. Various decrees offer Italian farmers financial aid for agricultural development of and settlement in these regions of Africa. The colonial governments have been made responsible for all public works such as road building, canal building, water power schemes, afforestation, drainage of swamps, irrigation, etc. And, by the Act (No. 358) of April 9, 1931, the Commissariat for Internal Migration and Home Settlement, whose business is the "rational" distribution throughout the country of the available labor supply, was given power to take any measures which might facilitate the transfer of agricultural and other workers to the Italian colonies.

The present land reclamation and soil improvement policy of Italy is thus born from the country's peculiar economic and demographic conditions and from a doctrine which presumes to obtain through agricultural improvement the solution of most of its national problems. The exponents of this new agricultural policy expect that it will increase the national production and income; will "correct" Italy's unfavorable balance of trade; and above all will enable an ever-increasing population to settle on the land and thus avoid the dangerous consequences which may result from wandering idle laborers.

The "Battle of the Grain" (*la Battaglia del Grano*) is only one particular manifestation, though a very fundamental one of the complex agricultural policy of the fascist régime. Inaugurated in 1925, its main objective is to increase wheat production to the point of freeing Italy from its dependence on foreign nations for bread. For a fuller understanding of this phase of the experiment it is necessary to know the importance of wheat in the Italian diet. Wheat constitutes 71.8 per cent of the total consumption of all cereals and other products of similar nature.[11] Since Italy has, next to France, the highest per capita consumption of wheat in Europe, it is important to note that with its population increasing more rapidly than that of any other European country, its demand for wheat has been constantly rising.

According to estimates,[12] Italy's annual requirements in wheat are 304,300,000 bushels, of which 282,300,000 go to consumption and 22,000,000 bushels for seed. For the five-year period of 1909-1914, the average annual production was 180,664,000 bushels, de-

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[11] Corn representing 18 per cent of the total, rice 4.8 per cent, rye 1 per cent, potatoes 3.6 per cent, beans 0.8 per cent.
A. Vivanza, *"La culture des céréales au point de vue économique et social en Italie."* Report to the 13th International Congress of Agriculture, Rome, 1927.

[12] Dr. Ernesto Cianci. *Ibid.*, p. 339.

creasing to 164,937,000 bushels for the annual average of the three years 1921 to 1923. Whereas the imports, which amounted to 49,500,000 bushels a year in the pre-war period of 1909-1913, had reached a maximum of 114,760,000 bushels in 1922-1923. To the then newly established fascist régimé, with its mercantilistic and nationalistic views, this situation seemed untenable. By the law of July 4, 1925, the Permanent Grain Committee was created. At present this committee is composed of eighteen members and has Premier Mussolini at its head. As stipulated in Article 2 of the law creating it, the committee's objectives are to search for and report to the government "all means which may increase wheat production in the country." Besides this organization there exists in each province a regional committee whose members are chosen by the various agrarian, industrial, and political groups of the province, the object of which is to help the local and central governments in matters pertaining to agriculture.

In the speech made in Rome on July 4, 1925, at the inauguration of the Permanent Grain Committee, Mussolini made it clear that the government's policy was not to increase the area producing wheat, but to help increase the average yield of that cereal. He said that the area planted in wheat in 1924 (11,278,760 acres) would be sufficient to provide the Italian nation with its wheat requirements if the yield per acre were substantially increased. A campaign was launched for the use of more fertilizers. Reduction in the price of fertilizers was arrived at as a result of special regulations reducing their transportation rates, their sales taxes, etc. As a result of this campaign the use of commercial fertilizers by Italian agriculturists rose from 1,458,279 tons in 1913 to 2,196,876 tons in 1929, declining, however, to 1,880,450 tons in 1930.[13] The following table shows the total production of wheat in Italy, the acreage sown, and the average yield for each year since the beginning of the "battle of the grain."[14] At the same time the government has tried, through a continuously increasing protective tariff, to assure Italian wheat growers of a paying return. Due to difficulties of various sorts, wheat growing in Italy is very expensive.[15] From the beginning of the "battle of

Year	Area planted acres	Total production bushels	Yield per acre bushels
1909-14 (Aver.)	11,757,200	180,664,000	15.4
1925-26	12,140,050	220,183,000	18.0
1926-27	12,290,720	195,400,300	16.0
1927-28	12,258,610	228,121,600	18.5
1928-29	11,796,720	260,128,000	21.9
1929-30	11,904,708	210,377,000	17.6
1930-31	12,070,000	248,407,500	20.4

[13] Dr. Ernesto Cianci. *Ibid.*, p. 344.
[14] *Ibid.*, p. 346.
[15] Dr. Ernesto Cianci, who is well acquainted with Italian agricultural conditions, thinks that a price lower than $1.35 per bushel will not "remunerate" Italian wheat growers for their cost of production. (*Ibid.*, p. 342.)

the grain'' wheat protection, which had been suspended since July, 1915, was resumed on July 24, 1925. At that date a duty of $0.38 per bushel was levied, gradually increasing to reach the present rate of $1.02 per bushel.[16] But in spite of this highly protective wall, wheat prices in Italy, following the trend of the world markets, have declined. And in spite of the increase in both production and yield (as compared to pre-war figures), wheat imports have also increased,[17] as shown by the following table:[18]

ITALIAN WHEAT PRODUCTION AND IMPORTS
(In millions of bushels)

	1909-13	*1921-22*	*1922-23*	*1923-24*	*1924-25*
Production	180	161	224	169	231
Net imports	49	114	69.3	88	69.3
Total	229	275	293.3	257	300.3
	1925-26	*1926-27*	*1927-28*	*1928-29*	*1929-30*
Production	220.3	195	228	260	210
Net imports	87.2	88	89.4	45	83.3
Total	307.5	283	317.4	305	293.3

If we now turn to consider the per capita consumption of wheat of the Italian people and project it into the future, we find some interesting facts. The average annual per capita consumption of wheat in Italy has been 6.7 bushels (402 pounds) for the three-year period 1928-1930. With the fascist régimé encouraging the increase of Italy's population (at present over 41,000,000), it is possible that the latter will keep on increasing at the same rate it has for the last fifty years. Assuming the annual per capita consumption of wheat to remain the same (6.7 bushels), we arrive at the significant figures shown in the following table:

Year	Predicted[19] population (in 1,000 inhabitants)	Per capita consumption (in bushels)	National consumption (in million bushels)
1941	46,192	6.7	309
1951	49,663	6.7	332
1961	53,197	6.7	356

While Mussolini and his associates are doing all in their power to increase the country's population and are continuously dreaming of a greater Italy, they cannot keep believing that the area planted in wheat in 1924 (11,278,760 acres, see above page 497) can feed a population of 53 million inhabitants. They will have to

[16] The following are the successive increases which have taken place in the tariff on wheat:

September 12, 1928	$0.57 per bushel
May 24, 1929	0.72 per bushel
June 5, 1930	0.82 per bushel
August 14, 1931	1.02 per bushel

[17] While shipments of American wheat to Italy declined steadily from 60,842,457 bushels in 1921 to 1,707,468 bushels in 1931. See *Foreign Commerce and Navigation of the United States*, 1921, p. 322, and 1931, p. 36.

[18] Ernesto Cianci. *Ibid.*, p. 347.

[19] Guiseppe Solari, *Le Mouvement et le Dévelopment Démographiques de l'Italie au Cours de la Dernière Décade.* Revue Economique Internationale, 24th year, Vol. I, No. 2, February, 1932, p. 438.

resort to some of the land now being reclaimed. Perhaps it is a good policy, however, to stimulate the Italian wheat growers and to have them become accustomed to producing high yields before breaking in new lands made tillable at such high costs and great sacrifices. Whatever the results, it is interesting to follow the experiment.

Intensification of Agricultural Production and Development of Agricultural Exports, Cooperation, and Education. The program of agricultural production of the fascist government consists not only of the realization for Italy of an independence as complete as possible with regard to its food supply. It also considers the intensification of production and, for certain products such as fruits and vegetables, the fostering of exports and the development of trade channels to that end. Agricultural cooperation has been given great impetus through hearty government support, and some innovations have taken place in the field of agricultural education.

Under Mussolini's intensification of production program many radical changes have been effected. Private ownership of land still prevails, but the owner is not entirely free to do as he pleases with his property. Every landowner has been instructed to study his farm and to work out plans to make it more productive. These plans are then submitted to a commission of government technical experts whose duty it is to pass upon them and when approved they must be adopted at once. In the case of government-financed reclaimed land, inefficient landowners or those who refuse to cooperate with the government are dealt with in a drastic fashion. Their land is expropriated at a price set by a government Board of Appraisers and payable in thirty annual installments. The land is then sold at the same price and on the same terms to anyone who is able to pay and willing to develop and improve it in a manner satisfactory to the government. This method of dealing with inefficient landowners is in accord with the fascist Charter of Labor which foresees state intervention when private initiative is lacking or ineffective.

When speaking about Italian agriculture, one should distinguish between the agrarian and the rural classes. In Italy the former constitute the large conservative landlords, whereas the latter are made up of small landowners, tenants, and day laborers. It is in the rural classes that Mussolini is mainly interested. They are by far the larger group, easier to handle and much easier to arouse. Many laws have been enacted to protect what the fascists love to call the "new rural democracy." Thus, besides

the severe governmental restrictions against the raising of land rents, changes in the *mezzadria* or crop-sharing system are of particular interest. Under the new laws, the landowner must provide his tenants with adequate and sanitary living quarters, pay the taxes, and furnish livestock and farm implements. The tenant in turn is responsible for the proper maintenance and cultivation of the land and for a portion of the repairs. Losses and profits from the sale of harvests and livestock are divided equally between the landowner and the tenant. The law also provides that the contract cannot be terminated except in the following manner. Before August 30 the landowner must, through the local courts, serve the tenant with a written notice. The tenant has until March 1 to vacate, but he is not entitled to take any products from the land after the end of the harvest in November.

To foster agricultural exports, the government has created the National Institute for Exportation, an agency to facilitate and encourage the building up of good relations between the Italian exporters and their customers in foreign lands. This institute is also in charge of all regulations, requirements, and in general all channels connected with the export trade. A "National Center for the Exportation of Horticultural Products" has also been created in Verona and has been conceded great advantages regarding freight rates and transportation facilities. It is estimated that the value of the Italian exports of fruits and vegetables exceeds $80,000,000 annually[20] and that this is destined to increase as rapidly as the agricultural program of the government can be worked out.

Agricultural cooperation has been greatly stimulated by the government. The object in this case is to foster what Mussolini calls "*La politica economica dei consorzi*" or the economic policy of the agricultural associations. The government's official intervention in matters pertaining to agricultural cooperation dates from the enactment of the law of April 3, 1926. This law advanced the principle that in order to be of benefit to the individual and at the same time be of service to the state, agricultural production must be inspired by a spirit of collaboration. As a result of this law, any Italian who is connected with agriculture in any capacity today belongs to one of the two following organizations: that of the employers, the National Fascist Confederation of Agriculturists (*Confederazione Nazionale Fascista degli Agricoltori*) and that of the workers, the National Con-

[20] M. Garcin. *L'Effort Italien pour Développer les Exportations Agricoles*, Académie d'Agriculture de France, Comptes Rendus. Vol. 16, No. 9, March 5, 1930, p. 379. Conversion of the French franc into dollars has been made on the basis of 25 paper francs to the dollar.

federation of Fascist Agricultural Syndicates (*Confederazione Nazionale dei Sindicati Fascisti dell' Agricoltura*). The National Fascist Confederation of Agriculturists is composed of ninety-two provincial federations, each of which is divided into provincial syndicates and provincial unions of cooperative agricultural enterprises. With the establishment, under the auspices of the Italian government, of the *Ente Nazionale della Cooperazione* which is the directing hand of all the cooperative movement of the country, an agreement was entered into between that organization and the National Fascist Confederation of Agriculturists. As a result of this agreement, the Central Office of Agricultural Cooperation (*Ufficio Centrale della Cooperazione Agricola*) was established in Rome. This is directly dependent on a committee of four, composed of two representatives of each organization. At the same time, in each province of the country a provincial committee receiving directions from the office at Rome was established.

The Italian Federation of Agricultural Associations (*Federazione Italiana dei Consorzi Agrari*) represents today the largest economic organization of the National Fascist Confederation of Agriculturists. It numbers about a thousand Federal agricultural associations, owns steamships and several fertilizer factories (producing one-fourth of the superphosphates produced in the country) and has affiliated with it some fifteen hundred local cooperatives and over two thousand rural banks. It has also founded the Section for Collective Sales (*Sezione Vendite Collettive*) which is at present composed of three main bodies:

1. The Bureau in charge of Cereal Sales (*Ufficio Vendita Cereali*) with headquarters both at Naples and Milan, and several branches throughout Italy. Its functions are the assembling and selling of the grain of its member associations.

2. The Bureau in charge of Wine Sales (*Ufficio Vendita del Vino*) with headquarters at Milan, the functions of which are the assembling and selling of wine.

3. The "Fedexport" with headquarters at Bologna, which is the center for the export of horticultural products. This organization, which represents numerous horticultural associations, is very well organized in Italy and outside of the country and has gained considerable ground in foreign fruit and vegetable markets.

Some progress has been made in the field of agricultural education. Through the work given in practical agricultural schools and in universities, agriculture has come very much into vogue.

The Traveling Chairs of Agriculture (*Cattedre Ambulanti di Agricoltura*), started by Doni, Ottavi, and Poggi, are the latest innovation in the spread of agricultural knowledge. These are subsidized by the government and their assistance and advice are being made available in the remotest parts of the country. As a result of the many reforms introduced in the Italian school system, the Fascist Institute of Agrarian Technique and Information (*Istituto Fascista di Tecnica e Propaganda Agraria*) was established. The Institute's aim is to encourage and coordinate agricultural studies throughout the country and at the same time to give technical advice to the farmers. It is also subsidized by the government, is well equipped and organized, and its promoters hope it can give a new orientation to Italian agriculture. It is also interesting to note that since the foundation of the National Institute of Agricultural Economics (1928) some effort is being made to replace with more abundant and accurate data the once defective and fragmentary information in matters pertaining to the economics of Italian agriculture.

"Everything in the State, nothing against the State, nothing outside the State" has been Mussolini's motto for his fascist régime. To a great extent Italy's experiment in agriculture also implies that the commercial interests of the large landowners would be subordinated to the economic interests of the State and the nation as a whole. The large landowners who formed the National Agrarian Party and who are very conservative are far from being in sympathy with this new movement. The rural class, however, does not seem to mind it, as long as the small landowner can still cling to his lot and the tenant can freely aspire to become some day a landowner. How much of this Italian experiment in agriculture is or will be successful? How far is government control workable under the capitalistic system? Is the experiment really helping the Italian masses? And is it of any interest to the American farmer? The experiment is too new to enable anyone to answer such questions with any degree of accuracy. It is by carefully following for a few years the development of the agricultural program of Italy that one will be able to appraise the true value of the effort made. In the meantime, such problems as the reaction of the Italian people to their government's agricultural experiment, the latter's effect on the whole social structure, and the attitude of the other European nations towards Italy's agricultural program may provide valuable study material for many workers in the fields of agricultural economics and rural sociology.

SPILLMAN'S SOLUTION OF THE EXPONENTIAL YIELD CURVE AND FERTILIZER PROBLEMS

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Fertilizer experimentation has engaged the attention of careful investigators for many years and a tremendous body of data is available. The accomplishments have been great. A huge industry has grown up predicated on the demonstrated facts that applications of plant foods do increase yields and that, in general, farmers who use them intelligently benefit financially.

The problems, however, have not all been solved. The experimentation goes on. New forms and new formulas are to be tested out; reactions of crops to different combinations and quantities have not all been sufficiently described; need is felt for better treatment of soils, in their almost infinite variety of composition and condition. Always there are also the related questions, granted the facts, Will a given application pay? What is the most profitable program?

These problems engaged the interest of Dr. W. J. Spillman for many years. Forty years ago he was conducting field experiments at the Agricultural Experiment Station at Pullman, Washington. After he came to the U. S. Department of Agriculture he became interested in fertilizer experimentation because the practical results of such experimentation were an important phase of farm management problems—making farms pay better. The connection is close: good yields are associated with profitable farming; use of fertilizer (in the broad sense of the term) enhances the yields of crops, but fertilizers cost money directly or indirectly, so judicious use involves wise selection of materials and economical application.

In arriving at profitable fertilizer practice farmers and fertilizer companies have made good use of the findings of the soils scientists and the chemists. Fertilizers promote the growth of crops; prices of fertilizers have approximated their different values in promoting growth and recommendations have in general been conservative enough to assure a profit to the farmer who accepted the recommendations. The farmer's principal problem with respect to fertilizers is an economic problem.

Keeping abreast of fertilizer experimentation Dr. Spillman sought the solution of the economic problem: Given any set of

conditions how much fertilizer can one afford to apply to get the best results? After many years of study he developed a method which, he believed, satisfies all the logical requirements of a complete solution; that is, a series of general equations which can be solved in terms of pounds of fertilizer of optimum analysis and dollars and cents of profit from the use of it.[1]

The fundamental proposition as Dr. Spillman saw it is that as additional units of a growth factor[2] are applied, the growth of a plant is increased at a decreasing rate up to a point at which no further growth will result from more of the growth factor. These relationships of the growth factor and the growth of the plant may be expressed by an exponential equation $Y = M - AR^x$ in which Y is the yield, M is the maximum yield possible, A is the increase in yield attributed to the application of the growth factor, R is the ratio between the increments in yield resulting from successive units of the growth factor and x is the number of units of the growth factor applied. There are several methods of solving this equation.

The fundamental equation serves in the case of a single growth factor or in the case of a mixed fertilizer. For more complicated problems it must be transformed. In fertilizer experimentation three plant foods are usually subject of observation—nitrogen, N, phosphoric acid, P_2O_5, and potash, K_2O—each with its own effect on growth resulting in its own ratio, R, between the successive increments of yield attributed to the growth factor. Moreover, besides the application in the form of fertilizer, soils have varying quantities of each plant food available to the crop. Thus the simple-looking fundamental equation becomes in its generalized form for three growth factors

$$Y = A\,(1 - R^{n+a})\,(1 - R^{p+b})\,(1 - R^{k+c})$$

Solution of this equation was long a stumbling block, largely because suitable data were not available in the literature. Dr. Spillman found the solution and presented it in a procedure which a good clerk with a computing machine can follow with expedition and certainty.

Having solved the equation for the yield resulting from unit applications of the growth factors, equations are set up in which

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[1] The method is explained in detail in Technical Bulletin 348, "Use of the Exponential Yield Curve in Fertilizer Experiments," which Dr. Spillman brought to the stage of preparing the bulletin for print just before his death in 1931. The writer, who had discussed the early drafts with Dr. Spillman, completed the manuscript.

[2] Any of the ordinary plant food elements or combinations of them (possibly also some of the less common elements) and any other factor that has similar results.

the value of the crop (unit price) varies, costs of plant food vary, and other pertinent phases of the problem are taken care of. One may solve these equations by methodically following directions. The method in both types of equation is "trial and error," but the course is well charted and the point of negligible error is soon reached.

Dr. Spillman thought of this last piece of work as his major contribution to knowledge. Discovery of an equation which expresses the relationships observed time after time in exact experimental results he shared with others. The arithmetical solution was his own. Because of its flexibility and simplicity, this arithmetical solution of a transcendental equation of seven variables constitutes a new tool for the research worker in fertilizer experimentation. Developed and demonstrated, in spite of the handicap of lack of data exactly suited to it, the method needed further trial. Such trial Dr. Spillman confidently looked forward to seeing through to a brilliant conclusion. No arrangements had been made, but he hoped that experiment stations or other research organizations would lay out an experiment according to his plan from beginning to end.

In the following discussion the writer seeks to present Dr. Spillman's answers to questions that were raised in the course of preparing the manuscript for printing. Since Dr. Spillman's death, no questions have been raised that had not been anticipated. Dr. Spillman felt that he had covered in his final draft all questions to which the answers were not otherwise available independent of his manuscript. The subject is complex and difficult; not all points are adequately elaborated for all readers; but the alternative was a much longer and even more involved manuscript, which his physical condition did not permit him to undertake.

In attempting this discussion the present writer stands in the anomalous position of an unconvinced critic and a sympathetic advocate. He claims neither depth of knowledge of the matters at issue or mathematical intuition sufficient to attest the ultimate truth of the propositions or the methods. He has had the experience of arguing many questions with Dr. Spillman and he believes that the final draft of the manuscript represents Dr. Spillman's convictions. The writer further believes that there are no logical faults in the argument not attributable to such as may arise from choice between controversial questions, and that, so far as he is willing to go, he gives Dr. Spillman's probable

answers to the questions discussed, such answers to be understood as subject to proof by others. He feels that Dr. Spillman could have and would have made further improvements in the presentation in the light of criticism after publication, just as the present stage was reached by development of the fundamental idea.

Relationship curves may in general be drawn "to fit" any set of observations—one may draw a free-hand smooth curve which may defy mathematical expression. In the fertilizer work the probabilities seemed to favor a regular curve, only the constants of which would vary with the circumstances of the immediate experiment. The constants are evaluated by the method of least squares. Departures of the observations from the curve drawn through them become "errors of observation." When meticulous care has been exercised throughout the experimentation it is perhaps hard to admit that there are material errors—that the errors are in the experiment rather than in the properties of the curve.

Two types of curve have been proposed, the exponential which Dr. Spillman advocated, and the parabolic which was advocated by Niklas and Miller and applied by them to observations of plant growth in carefully controlled pot experiments. Accepting the observations of Niklas and Miller, Dr. Spillman compared his exponential curve with their parabolic curve and found that by the usual tests his curve was superior in a majority of cases. These tests included several sets of computations in which the constants of each type of curve were determined by part of the series of observations and the calculated values for the other points were compared with the observed values. Within the range of observations the advantage of the exponential curve is somewhat obscured. When the series of observations is long enough so that each curve may be computed from part of the observations the fit of the exponential curve to the other observations is far superior to the fit of the parabolic curve. No further consideration of the parabolic curve seemed necessary. Manipulation of the exponential curve is on the whole vastly less troublesome except in the simplest cases.

Dr. Spillman gives the curve the status of a "law." He was satisfied that the curve met all the logical requirements of the status he accorded it. Acceptance of the curve as law made it possible to explain as errors in the observation any small differences between coordinates of the calculated curve and the ob-

servations. No series of data to which he applied his analysis failed him in this line of argument. The departures of observed values from the values he calculated could all be rationalized as attributable to some physical phase of the experiment. He searched the reports of fertilizer experiments for series which would permit demonstration of his analysis without resort to rationalization of "errors" in the observations. Finding none he used that nearest suitable for his purpose.

The data of the tobacco experiments of Dr. W. W. Garner, Bureau of Plant Industry, at Tifton, Ga., which Dr. Spillman used to demonstrate his analyses, were only partly satisfactory. The plan of applying fertilizer was adaptable to the computations—one plant-food element was applied in increasing doses, the other two were held constant, and each plot (except the check plots) received all three plant foods. The number of plots was sufficient for the computations. But the experiments had run six years and there were vagaries in the observed yields attributable to factors other than the fertilizer applications. These factors were appraised and their effect corrected for before the analysis of the effects of the several growth factors under observation could be undertaken. These necessary steps—elimination of extraneous factors at the end of the experimental period instead of anticipating them in the planning—give the reader a basis for questioning the reality of a method that looks so much like pure "curve fitting." On the other hand perhaps it is fortunate that the demonstration uses data that need adjustment, for one could hardly expect to assemble in a field experiment a set of data free from complicating factors.

One set of complicating factors has to do with the unevenness of soils and the determination of the amounts of the several growth factors available to the growing plants in the soil not counting the application in the fertilizer. Whether such plant food is "absorbed" by the soil, or, as others might say, "occluded," is a secondary consideration. Even on the plots receiving no fertilizer there are in field soils enough nitrogen, phosphoric acid, and potash to stimulate some growth. The plots receiving applications of fertilizer are regularly presumed to have about the same quantities of plant food as the no-fertilizer plots. But the plant-food content of the soil of no-fertilizer plots cannot be measured directly. These values are imputed from the determinations on the fertilized plats. Thus provision is made for use, as check plots, of plots receiving one unit of each plant

food element. The "no-fertilizer" plots may be included in the layout for whatever value may have in appraising the results, but they do not contribute directly to the solution of the yield curve. The "check yield" used is the yield from the check plots, all fertilized, and is computed also for the other fertilized plots. The closeness of the check yields computed from each series of plots gives a measure of the uniformity of the soils. A series of specially fertilized plots is needed for evidence on the quantity of plant food absorbed or occluded.

Fertilizers affect the quality of a crop. In the demonstration with tobacco it was admitted and noted that phosphoric acid hastens the maturity of the crop and enhances its value. The yield curve measures quantity; quality factors it cannot measure directly. In other cases likewise, the variations in quality associated with the different sources of the plant foods may be of quite as much significance as the quantity variations brought out by means of the yield curve.

The yield-curve computations involve computation of a value *M*, the "maximum yield obtainable if the application of fertilizer is made very large." Dr. Spillman recognized the possibility of a toxic effect of too heavy an application of fertilizer, but he seemed to have little apprehension that the practical limit of profitable application would be crowded, and the notes do not show any suggestion as to where the toxic effect might begin to appear. The whole purpose of the computations has been to find the maximum profitable application of fertilizer. There is a possibility that under some price relationships the indicated maximum might in fact be so heavy as to be positively detrimental to the growth of the crop. Such cases were not found, and the chances are against the concurrence of conditions which would suggest a detrimental application. Some work on this phase of fertilizer experimentation may need to be done. Dr. Spillman argued that, even if later it should be proved that some very large dosage would cause damage rather than further increment in the crop, all that he claimed for the properties of the curve would hold true for dosages less than that causing damage. Toxicity, if it appear, is a new extraneous factor that does not affect the validity of the curve.

Extrapolation has always been more difficult and troublesome than interpolation. In the early stages of review of the manuscript doubt was expressed about the accuracy of estimates of yield which would have been obtained if a given application

larger than any actually applied had been used. The position taken was that such estimates are subject to verification; that, practically, it is not safe to go far beyond the range of observation without checking (the heaviest application should be enough to produce about 90 per cent of the theoretical maximum yield); that extrapolation had been satisfactory in the cases where the constants of the curve were determined from a few of the observations and used in extrapolation for the largest observation in the series; that within the range of application of fertilizer used in experiments or in field practice, no hint had been found that the curve would fail to give values within the margin of error of the most careful experimental work.

Evaluation of the equations has been made relatively easy; that is a clerical job. Acquiring the data necessary to the evaluations, if full use is to be made of the general solution of the typical problems described, is another matter. Dr. Spillman was inclined to discount these difficulties, to rate them as materially less than other difficulties encountered in carrying out and interpreting experiments otherwise conducted. The ability promptly and definitely to reach practical answers to economic problems, the variables of which must be considered as acting concurrently, makes the method attractive. Usable results warrant effort and expense enough to get them. Whatever the final verdict on certain questions still moot in fertilizer theory and practice, the way has been prepared for further work in this field with a new tool of a type which has been highly effective in other fields.

COMPARATIVE PRICES OF FARM PRODUCTS IN CANADA AND THE UNITED STATES SINCE 1920[1]

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As an introduction to the discussion of specific commodity prices during the period since 1920 it perhaps may be of interest to note the trend of wholesale prices in general and of the prices of farm products as a group in Canada and the United States since the years just prior to the World War.

In Table 1 the course of wholesale prices in the two countries is indicated by comparative indexes. During the years of the War and until 1920 prices in Canada moved upward more rapidly than those of the United States and reached a high point of 244

Table 1. Index Numbers of Wholesale Prices in Canada and the United States

Year	*Canada*[1]	*United States*[2]
1913	100	102
1914	102	99
1915	110	102
1916	132	125
1917	178	172
1918	199	192
1919	209	202
1920	244	225
1921	172	142
1922	152	141
1923	153	147
1924	155	143
1925	160	151
1926	156	146
1927	153	139
1928	151	141
1929	149	139
1930	135	126
1931	113	107
1932 September	104	95

[1] Dominion Bureau of Statistics, 1913 = 100.
[2] Bureau of Labor Statistics, 1910-14 = 100, as reported in The Agricultural Situation, United States Department of Agriculture, November, 1932.

compared with a high of 225 in the United States. The subsequent decline was less rapid in Canada, the index standing at 172 in 1921 compared with 142 for the United States. However, there was a further decline of about 20 points in Canadian prices in 1922 while United States prices receded only one point.

From 1922 to 1929 prices in both countries moved within a range of 10 points with the movement upward until 1925 and downward from 1925 to 1929. During this period the Canadian index ranged from 6 to 14 points above that of the United States. In the downward movement since 1925 the decline has been about 37 per cent in the United States and 34 per cent in Canada.

[1] This paper was read at the Twenty-Third Annual Meeting of the American Farm Economic Association, Cincinnati, Ohio, December 29, 1932.

Indexes of the Prices of Farm Products

The general trend of the prices of farm products in the two countries since 1913, as shown by comparative index numbers, has been similar although the Canadian index, in keeping with the general commodity index, was maintained at a somewhat higher level. (Table 2 and Figure 2.) In this comparison we are compelled to use wholesale prices since no index of prices paid to farmers is available for Canada.

The Canadian index, as in the previous case, responded more

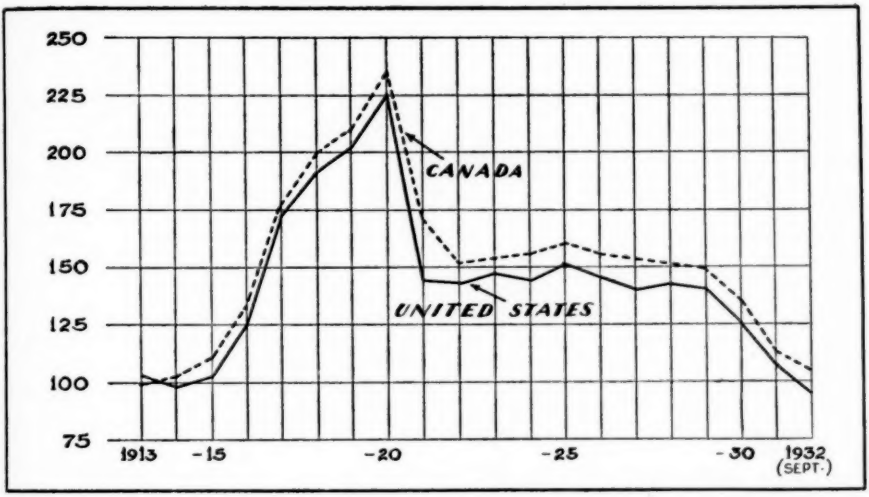

FIGURE 1.—Index Numbers of Wholesale Prices in Canada and the United States.

rapidly to the effect of war-time influences than that of the United States probably due, in part at least, to the earlier participation of Canada in hostilities with resultant increased purchases and earlier effects of inflation. In any case the wholesale prices of farm products in Canada during 1914 and 1915, as reflected by the index, showed substantial increases whereas there was no change until 1916 in the United States. In subsequent years, up to 1920, prices in both countries responded actively to war-time demands and inflation but the Canadian index continued to move upward at a more rapid rate until a maximum yearly average of 258 was attained in 1920 compared with 220 for the United States in 1919.

In the decline that followed, the general trend was somewhat the same in the two counties but the deflating process was more rapid in the United States and the new low point reached earlier

than was the case in Canada. Likewise, the recovery came somewhat earlier in the United States. However, by 1925 the Canadian index had again attained relatively higher ground and from then to 1929 stood substantially above that of the United States and the purchasing power of the Canadian farmer measured in terms of the general commodity index appears to have been somewhat better than that of his southern neighbor. This was the period during which farmers of the United States were urging Congress to consider plans for the relief of American agriculture.

TABLE 2. INDEX NUMBERS OF WHOLESALE PRICES OF FARM PRODUCTS IN CANADA AND THE UNITED STATES

Year	*Canada*[1]	*United States*[2]
1913	100	100
1914	111	100
1915	124	100
1916	143	118
1917	208	180
1918	212	207
1919	232	220
1920	258	211
1921	164	124
1922	138	131
1923	128	138
1924	139	140
1925	160	154
1926	160	140
1927	163	139
1928	161	148
1929	161	147
1930	131	124
1931	90	91
1932 September	75	69

[1] Dominion Bureau of Statistics, Wholesale Prices converted from 1926 base to 1913 base by dividing by 1913 average, 62.6.
[2] United States Bureau of Labor Statistics, Wholesale prices October 1932 converted from 1926 to 1913 base by dividing by 1913 average, 71.5.

Limitations

Before launching into a discussion of prices of specific commodities a brief statement on the limitation, selection and interpretation of data seems desirable.

In comparing prices of farm products in one country with those of another some difficulties are encountered. These have to do with the comparability of quality, grades and prices. Such difficulties, of course, also exist in comparing prices in any two markets of the same country but they are probably less significant than in international comparisons. It may be said, however, that there is probably a greater similarity in methods of marketing, in quality and grade of product and in methods of compiling price data in the case of the United States and Canada than would ordinarily be found in comparisons involving two different countries.

Some thought was given to the question of whether to use

prices reported for specific markets or averages for the respective countries. In a number of instances the limitation of data effectively settled this issue but in others where more complete information was available both comparisons were made.

The period of years to be used was also the subject of some discussion. Again limitation of data was the deciding factor in many instances. After considering a number of factors it was finally decided to limit the study to prices prevailing since 1920.

No attempt will be made in this presentation to translate mar-

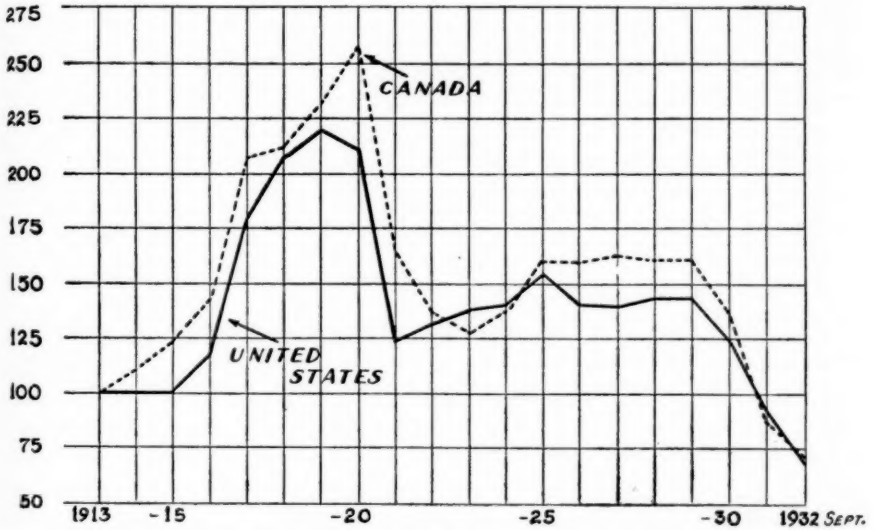

FIGURE 2.—Index Numbers of Wholesale Prices of Farm Products.

ket prices into net returns. This would involve an analysis of freight rates, distributors' margins and other factors that are beyond the scope of this paper.

In selecting products an attempt was made to get most of those of major importance produced in both countries; however, several products of less significance were included in order to demonstrate the effect of tariffs on prices. Unfortunately no data considered satisfactory or comparable are available for analysis in the case of fruits and vegetables.

Comparative Prices of Wheat

Considerable work has been done in comparing prices of wheat in Canada and the United States. Usually such comparisons have involved prices of specific grades in certain markets, frequently

Winnipeg and Minneapolis. The grades commonly chosen have been Number 1 Northern Spring at Minneapolis, and Numbers 2 or 3 Northern at Winnipeg, on the assumption that the Canadian wheat is of a little higher milling value. In the comparison which will follow, the same numerical or relative grade is used in each country since it is prices to producers for grade and quality bearing the same relationship to the range of grades and quality found in each country that we are considering. This, it might be mentioned, is also the basis of comparison adopted for other products referred to in this analysis.

In the accompanying table, in addition to giving Winnipeg and Minneapolis prices, the analysis is carried a stage further—average prices received by all farmers for all grades being considered. A review of these data indicates that the average price received by farmers in the United States since 1920 has been higher than the Canadian average in every year but one. Not quite the same relationship holds as between Winnipeg and Minneapolis prices, however. Here, the advantage has occasionally been with the Manitoba city.

The fact that Winnipeg prices have, in certain years, been above Minneapolis is held by some to indicate that the United States tariff (30 cents per bushed in 1922 and 42 cents since 1924) has not been effective in giving American farmers a better price than Canadian farmers have received. This, it has been urged, supports the contention that in the case of products of which there is an exportable surplus, the world or export price is the deciding factor in determining local prices.

Without entering into an involved discussion of this controversial point, it might be stated that in the United States there is no one price for wheat. There are several major producing areas and as many important consuming sections with different demands. Although the country as a whole is on a net export basis there have been shortages of wheat of the grade, quality and class required by certain markets.[2] This combination of production and marketing conditions has frequently resulted in premiums for wheat from certain sections. Such premiums have at times added materially to Minneapolis, Chicago or Kansas City prices of standard grades. Domestic prices, in such cases, have been higher than prices available in export markets. It is this set of circumstances which has resulted in the payment of

[2] Geographic position of producing areas, freight rates, quality of wheat and other factors affect prices and should be considered in any detailed discussion of this subject. The scope of this paper does not permit of such treatment.

better average prices for wheat in the United States, although in a particular year, the price of the same relative grade and class of wheat may have been higher in certain Canadian markets.

TABLE 3.—WHEAT: AVERAGE PRICE PER BUSHEL RECEIVED BY PRODUCERS IN CANADA AND THE UNITED STATES AND COMPARATIVE PRICES AT WINNIPEG AND MINNEAPOLIS

Crop Year	Average Farm Price			Average Market Price		
	Canada[1]	United States[2]	Difference in favor of United States	Winnipeg[3] No. 1 Northern	Minneapolis No. 1 Northern Spring[4]	Difference in favor of Minneapolis
	dollars	dollars	cents	dollars	dollars	cents
1920–21	1.62	1.83	21	2.13	2.07	−6
1921–22	.81	1.04	23	1.28	1.43	15
1922–23	.85	.98	13	1.07	1.20	13
1923–24	.67	.92	25	1.01	1.17	16
1924–25	1.22	1.28	6	1.63	1.56	−7
1925–26	1.23	1.46	23	1.42	1.61	19
1926–27	1.09	1.24	15	1.43	1.46	3
1927–28	1.00	1.20	20	1.45	1.36	−9
1928–29	.80	1.00	20	1.25	1.18	−7
1929–30	1.05	1.05	0	1.23	1.33	10
1930–31	.49	.66	17	.68	.83	15
1931–32	.39	.40[5]	1	.59	.70[5]	11

[1] From Handbook of Instructions to Crop Correspondents, Dominion Bureau of Statistics.
[2] Yearbook United States Department of Agriculture 1932, p. 593, 1927, p. 756.
[3] Average price weighted by carlot inspections computed by Dominion Bureau of Statistics.
[4] Average of daily prices weighted by carlot sales. Yearbook United States Department of Agriculture 1932, p. 593, 1927, p. 757.
[5] Six months July–December.

Flaxseed

In the case of this product United States prices have very definitely exceeded Canadian prices throughout the whole of the period under review. In the accompanying table average farm prices together with Winnipeg and Minneapolis prices for number one grade flax are given. The average price paid to producers in the United States has ranged from 24 to 52 cents per bushel over Canadian prices. The comparison of Minneapolis and Winnipeg prices shows the same general results although in the majority of years the differential was not quite as great as that indicated by general averages.

The production of flax in the United States during the past decade has amounted only to about one-half the total domestic requirements. Imports have averaged about 20,000,000 bushels annually. Canada, on the other hand, has been an exporter of this product, a considerable volume going to the United States.

The tariff on flax entering the United States has been raised by successive stages from 20 cents in 1913 to 25 cents in 1921, 40 cents in 1922, and 56 cents in 1929, where it now stands. Al-

though the difference between United States and Canadian prices has not equalled the amount of the tariff it is evident that the margin enjoyed by American producers has been quite significant.

TABLE 4.—FLAXSEED: AVERAGE PRICE PER BUSHEL RECEIVED BY FARMERS IN CANADA AND THE UNITED STATES AND COMPARATIVE PRICES AT WINNIPEG AND MINNEAPOLIS

Crop Year	Average Farm Price			Average Market Price		
	Canada[1]	United States[2]	Difference in favor of United States	Winnipeg[3] Grade No. 1 C.W.	Minneapolis[4] Grade No. 1	Difference in favor of Minneapolis
	dollars	dollars	cents	dollars	dollars	cents
1920–21	1.94	2.18	24	2.08	2.09	1
1921–22	1.44	1.71	27	2.04	2.19	15
1922–23	1.72	2.10	38	2.21	2.58	37
1923–24	1.77	2.12	35	2.11	2.44	33
1924–25	1.94	2.21	27	2.40	2.63	23
1925–26	1.85	2.24	39	2.19	2.52	33
1926–27	1.62	2.06	44	1.92	2.24	32
1927–28	1.55	1.92	37	1.87	2.20	33
1928–29	1.59	2.07	48	2.01	2.33	32
1929–30	2.38	2.66	28	2.52	2.92	40
1930–31	.94	1.46	52	1.13	1.65	52
1931–32	.79	1.15[5]	36	.87	1.40[5]	53

[1] Price received by producers as reported in the Handbook of Instruction to Crop Correspondents and in the December 15, 1932, Crop Report: publications of Dominion Bureau of Statistics.
[2] Yearbooks United States Department of Agriculture 1932, p. 645, 1926, p. 878.
[3] Monthly average daily closing prices for Number 1 C.W. weighted by monthly inspections. Compiled by Dominion Bureau of Statistics.
[4] Average daily prices for Number 1 flax weighted by carlot sales. Yearbook United States Department of Agriculture 1932, p. 646.
[5] Four months September–December.

Corn

Canada's position with respect to corn is somewhat the same as the position of the United States on flax—not enough is produced to meet domestic requirements. Imports in recent years have run from ten to fifteen million bushels a year which is between two and three times domestic production. The ravages of

TABLE 5. ESTIMATED AVERAGE PRICE PER BUSHEL RECEIVED BY PRODUCERS

Year	*Canada* dollars	*United States*[2] dollars	*Difference in favor of Canada* cents
1920-21	1.16[1]	.62	54
1921-22	.83	.54	29
1922-23	.83	.75	8
1923-24	.92	.82	10
1924-25	1.19	1.07	12
1925-26	.94	.71	23
1926-27	1.00	.74	26
1927-28	.99	.85	14
1928-29	1.12	.84	28
1929-30	1.06	.81	25
1930-31	.87	.60	27
1931-32	.42	.35[3]	7

[1] Handbook of Instructions to Crop Correspondents and Summary of Annual Agricultural Statistics.
[2] Yearbooks United States Department of Agriculture 1927, p. 785, and 1932, p. 616.
[3] Three months October-December.

the corn borer were responsible for a marked reduction in Canadian plantings during the years following 1925.

Under these conditions and with the support of a tariff on corn imported for distilling purposes Canadian prices have ranged from 7 to 54 cents per bushel above those paid in the United States. The higher average price paid in Canada is also in part due to freight and other costs entailed in importing corn and also to a somewhat more direct method of marketing in Canada.

Beef Cattle

Prices paid at Chicago for comparable grades of beef cattle have been materially higher than those paid at Winnipeg since 1920. In the accompanying table similar weights of butcher steers are used for purposes of study. It is not possible to get entirely comparable classes of beef animals since the Chicago market receives a larger percentage of grain fed animals which tend to bring higher prices. Prices at South St. Paul, if available, would make a better comparison. It should be noted also that Chicago and Winnipeg are not entirely comparable, geographically, as marketing centers but the comparison is probably as good as can be made since exactly comparable markets and statistics are not available and, in any case, the advantages which, in this case, are in favor of Chicago are not sufficient to explain the difference in price. During most of this period, Winnipeg prices have tended to reflect Chicago or South St. Paul prices, less transportation costs and the United States tariff. Exports to the United States, though inconsiderable in proportion to the quantity of similar stock of domestic origin marketed in the United States, have, nevertheless, been an important price determining factor in the smaller Canadian markets. The U. S. tariff in 1922 was set at 1½ cents per pound on animals weighing less than 1,050 pounds and 2 cents per pound on those weighing more. In 1930 the weight limit was lowered to 700 pounds and the rate increased a cent a pound on each class thus doubling the charge on cattle weighing between 700 and 1,050 pounds.

In this connection it is interesting to note that the United States exports a considerable quantity of beef each year, the total being 152,320,000 pounds in 1925-26 and 98,379,000 in 1930-31. Here again, as in the case of wheat, we have an illustration of how local demand at times and in certain markets make possible higher prices than may prevail in export markets.

In certain years, exports of live cattle to the United Kingdom

market have absorbed a portion of the Canadian surplus at prices that have made such shipments profitable. These have not, however, been sufficient to raise the average of Canadian prices to a level equal to those prevailing on United States markets.

TABLE 6. BUTCHER STEERS: AVERAGE PRICE PER CWT. AT WINNIPEG AND CHICAGO[1]

Year	*Winnipeg*[2] *1050 lbs. and up.* dollars	*Chicago*[3] *1050-1200 lbs.* dollars	*Difference in favor of Chicago* dollars
1920	10.46	12.50	2.04
1921	5.78	7.65	1.87
1922	5.46	8.40	2.94
1923	5.57	9.35	3.78
1924	5.27	9.40	4.13
1925	5.88	10.00	4.12
1926	5.99	9.70	3.71
1927	7.28	11.50	4.22
1928	9.30	13.85	4.55
1929	8.95	13.05	4.10
1930	6.98	10.85	3.87
1931	5.45	8.45	3.00

[1] In spite of the similarity in weight of steers used in this comparison the data are not entirely comparable due to the difference in quality resulting from a higher percentage of grain fed cattle reaching the Chicago market.
[2] Annual Live Stock Market and Meat Trade Review, Dominion Department of Agriculture.
[3] *Chicago Daily Drovers Journal*, January 2, 1932.

Hogs

In all but three of the past twelve years, 1920 to 1931, inclusive, the average price of hogs at Winnipeg has been higher than the price at Chicago. It should be noted in this comparison that Canadian production is predominately of the bacon breeds of hogs while the United States output is mainly of the fat or lard type breeds.

Until recent years Canada has been a substantial exporter of hogs and hog products. Certain grades of live hogs have moved in considerable volume to United States markets. In 1914, a total of 214,709 head went south across the border but from that time until 1924 the volume, with the exception of one year ranged from 329 to 28,887 head. Then began an increased movement which reached a peak of 194,657 head in 1927 only to be followed by reductions which all but eliminated the business by 1931.

Exports of bacon and pork reached high levels during the war years. Amounts in excess of 200,000,000 pounds were exported to Great Britain during each of several years. From 1919 to 1923 the volume fell off to less than half the peak output. Increases followed in 1924 and 1925, but subsequent declines had by 1931 very nearly eliminated Canada from the export market. There has, since then, been considerable improvement in volume.

The United States has also been a heavy contributor to international trade in pork products, the volume of exports ranging

from one to two billion pounds annually during the period 1914 to 1930.

In searching for an explanation of the higher prices prevailing in Canada, one is confronted with several factors: first, that Canada has had a standardized government grading policy since 1922 which has resulted in the production of bacon type hogs; second, a premium has been paid for hogs grading "select"; third, improvement in quality coupled with the educational work and advertising accompanying acceptance of government grading has resulted in a marked increase in Canadian consumption; fourth, Canadian bacon has found favor with the Canadian people and in the United Kingdom and other world markets.

TABLE 7. HOGS: AVERAGE PRICE PER HUNDREDWEIGHT AT WINNIPEG AND CHICAGO

Year	*Winnipeg*[1] $	*Chicago*[2] $	*Difference in favor of Winnipeg* 0
1920	18.33	9.66	8.67
1921	12.01	9.01	3.00
1922	10.93	7.93	3.00
1923	8.64	7.58	1.06
1924	7.66	11.59	—3.93
1925	11.31	12.18	—0.87
1926	12.17	10.70	1.47
1927	9.62	9.58	.04
1928	9.20	10.20	—1.00
1929	11.00	9.67	1.33
1930	10.68	7.15	3.53
1931[3]	5.91	4.63	1.28

[1] Average price of thick smooth grade 1920-29 and butcher hogs 1930-31.
[2] Average of medium, good and choice grades, exclusive of pigs, boars, stags, extremely rough sows and cripples. From Yearbook United States Department of Agriculture 1932, p. 789.
[3] Three months average October-December.

Sheep and Lambs

Prices of sheep and lambs at Winnipeg[3] during most of the period from 1920 to 1931 were below those at Chicago, the spread being greatest in the case of lambs. (Table 8.) During most of this period Canada was on an export basis although sales abroad have been greatly reduced in recent years. In 1920 about 182,000 head were shipped to United States markets. The movement was reduced to 97,413 head in 1921 and subsequently declined each year with the exception of 1925 and 1926 until, in 1931, only 1,118 were sent south. The United States tariff on sheep and lambs was increased from 10 per cent ad valorem to 1 cent a pound in 1921, then to $2.00 a head in 1922 and, finally, $3.00 in 1930. Shipments of sheep and lambs to Great Britain have been negligible.

[3] Toronto is a better market for sheep and lambs and also other live stock than Winnipeg but geographically is not comparable with Chicago. Toronto prices average more than $1.00 per cwt. better than Winnipeg.

As with live animals, so with mutton and lamb; Canadian exports have been substantial until very recent years. Exports to the United States reached a peak of 8,027,500 pounds in 1920, declining steadily until by 1931, only 21,800 pounds found their way south over the boundary. Exports to Great Britain, although smaller in quantity, have followed somewhat the same trend. They reached peaks in 1921 and 1924 and subsequently declined to the vanishing point in 1926. Exports to other countries have not been material. Imports of mutton and lamb by the United States have not been large in comparison with total consumption but, nevertheless, have been a factor in international trade. Tariff rates have been 2½ cents per pound on mutton and 4 cents on lamb since 1922.

TABLE 8.—SHEEP AND LAMBS: AVERAGE PRICE PER HUNDREDWEIGHT AT WINNIPEG AND CHICAGO

Year	Sheep			Lambs		
	Winnipeg[1]	Chicago[2]	Difference in favor of Chicago	Winnipeg[1]	Chicago[2]	Difference in favor of Chicago
1920	$7.23	$9.49	$2.26	$11.11	$15.50	$4.39
1921	5.21	5.13	−.08	8.88	9.86	.98
1922	5.99	7.15	1.16	10.15	13.68	3.53
1923	6.51	7.10	.59	10.49	13.89	3.40
1924	6.63	7.57	.94	11.55	14.57	3.02
1925	6.78	8.16	1.38	11.41	15.66	4.25
1926	7.11	7.25	.14	10.85	14.26	3.41
1927	6.57	7.04	.47	11.08	14.12	3.04
1928	7.50	7.39	−.11	11.81	14.99	3.18
1929	6.40	6.87	.47	10.89	14.62	3.73
1930	4.63	4.32	−.31	8.28	9.69	1.41
1931	3.19	2.79	−.40	6.49	7.26	.77

[1] From averages appearing in the Annual Live Stock Market and Meat Trade Review 1923, 1927, 1931, Department of Agriculture, Canada, for good handy weight sheep and lambs which comprise about three-quarters of total sales.

[2] Prices as reported in Yearbook United States Department of Agriculture 1932, p. 802, for Bulk of Sales.

Wool

Wool is a commodity imported in large quantities by the United States each year. Until the imposition of higher tariffs (25 per cent ad valorem 1921 and 31 cents per pound washed wool 1922) Canadian wool brought satisfactory prices in American markets. That fact, together with heavy war-time demands, gave Canadian producers prices equal to or higher than those prevailing in the United States.

Since 1920 prices to Canadian producers have averaged considerably less than those received by farmers of the United States (Table 9). The tariff which amounts to about 15 cents per pound on a grease basis has been a difficult barrier for Canadian

wool to surmount and has been the most important factor in determining the difference between prices in the two countries since a considerable portion of the Canadian crop is still sold at Boston.

In this connection it may be of interest to note that Canada is actually on a net import basis also. The explanation for shipments abroad, while the country imports millions of pounds annually, is that certain grades of Canadian wools, particularly the down combing wools, are readily saleable on world markets at top prices and up to the present have been in part passed up by Canadian manufacturers who, on account of free entry of wools into Canada have been able to substitute low priced wools for current demand. Gradually, however, Canadian graded wools are finding a larger market outlet in the Canadian market and it is expected that exports will decrease.

Notwithstanding proportionally heavy imports, the quantity exported and prices received in the United States, less duty, have been the most important factors in determining Canadian prices.

TABLE 9. WOOL: ESTIMATED AVERAGE PRICE PER POUND RECEIVED BY PRODUCERS IN CANADA AND THE UNITED STATES

Year	*Canada*[1] cents	*United States*[2] cents	*Difference in favor of United States* cents
1920	22	39	17
1921	14	16	2
1922	18	30	12
1923	20	39	19
1924	25	37	12
1925	25	38	13
1926	23	32	9
1927	22	31	9
1928	26	37	11
1929	22	31	9
1930	11	20	9
1931	8	14	6

[1] Monthly Bulletin of Agricultural Statistics, Dominion Bureau of Statistics, March 1932.
[2] Yearbooks United States Department of Agriculture 1927, p. 1041, and 1932, p. 812.

Butter

Basic quotations for butter at New York have averaged from one to nine cents higher than similar quotations at Montreal during each of the past twelve years (Table 10). Canadian prices have held nearer to export levels in spite of the fact that imports in recent years have exceeded exports. The bulk of the product imported, which reached a total of 42,000,000 pounds in 1930, has come from Australia and New Zealand. Trade agreements with these countries permitted butter to enter Canada at a tariff rate of one cent per pound during most of the period since 1925. Agreements made with Australia, effective August 1931, and

with New Zealand, effective May 1932, placed the rate at five cents per pound. Apart from rates set under these trade agreements the Canadian tariff enacted in 1922 was three cents per pound British preferential, four cents Intermediate and four cents General. These rates were increased to 8, 12 and 14 in

TABLE 10. BUTTER: AVERAGE PRICE PER POUND AT MONTREAL AND NEW YORK

Year	*Montreal*[1] cents	*New York*[2] cents	*Difference in favor of New York*
1920	.58	.61	3
1921	.42	.43	1
1922	.36	.41	5
1923	.38	.47	9
1924	.37	.43	6
1925	.39	.45	6
1926	.39	.44	5
1927	.40	.47	7
1928	.41	.47	6
1929	.42	.45	3
1930	.34	.37	3
1931	—	.28	—

[1] Prices for 1920-26 inclusive are for finest creamery butter. Reported by Dominion Bureau of Statistics in Prices and Price Indexes 1913-26, p. 53. Prices for 1927-30 inclusive are for number one creamery 92 score minimum. Prices and Price Indexes 1913-30, p. 92.

[2] Prices for 92 score creamery butter. Yearbook United States Department of Agriculture 1932, p. 840.

1930. Imports from countries other than Australasian have not been significant during the past decade.

Exports of butter from the United States have about balanced imports in recent years. Domestic prices were supported by a tariff of 8 cents per pound from 1921 to 1926, which was raised to 12 cents in the latter year and again to 14 cents in 1930.

Cheese

A comparison of New York and Montreal wholesale prices (Table 11) for Number 1 cheddar cheese indicates that prices in the United States have averaged considerably higher than those

TABLE 11. CHEESE: AVERAGE PRICE PER POUND OF NUMBER ONE CHEESE AT MONTREAL AND NEW YORK

Year	*Montreal*[1] cents	*New York*[2] cents	*Difference in favor of New York*
1921	.22	.21	—1
1922	.18	—	—
1923	.21	—	—
1924	.17	.21	4
1925	.21	.24	3
1926	.18	.23	5
1927	.19	.26	7
1928	.23	.25	2
1929	.22	.24	2
1930	.19	.20	1
1931	.14	.15	1

[1] Average of monthly quotations for large cheddar cheese 1921-27 inclusive reported in Montreal *Gazette*. 1928-31 inclusive Dominion Bureau of Statistics, Prices and Price Indexes 1913-1931, p. 92.

[2] Average prices cheddar cheese, Daisies 1924-31 and fresh flats 1921. Yearbook of U. S. Department of Agriculture, 1932, p. 845, 1927, p. 1088.

of Canada since prices quoted for these two cities are believed to reflect prevailing prices throughout each country.

The explanation of the higher United States prices is apparently found in the different positions of the two countries in international trade—the United States is a heavy importer of cheese while Canada is a heavy exporter. The Dominion, prevented from shipping to the United States by a tariff which for some years has been virtually prohibitive (5 cents per pound but not less than 25 per centum ad valorem, 1922 Tariff Act and 7 cents per pound and not less than 30 per cent advalorem 1930) has had to depend upon world markets.

Eggs

A comparison of egg prices at Toronto and Chicago indicates that the difference has been substantially in favor of the Canadian City throughout the whole of the period 1920-31, the margin ranging from 3 to 13 cents per dozen (Table 12). These two

TABLE 12. EGGS: COMPARATIVE PRICES PER DOZEN FOR FRESH FIRSTS AT TORONTO AND CHICAGO

Year	*Toronto*[1] cents	*Chicago*[2] cents	*Difference in favor of Toronto*
1920	63	52	11
1921	48	36	12
1922	41	30	11
1923	44	31	13
1924	38	34	4
1925	44	37	7
1926	37	34	3
1927	40	30	10
1928	40	32	8
1929	38	35	3
1930	37	27	10
1931	26	20	6

[1] Yearly average based upon quotations for the first of each month. Compiled by Poultry Division, Live Stock Branch, Dominion Department of Agriculture.
[2] Average prices Yearbooks United States Department of Agriculture 1927, p. 1105, and 1932, p. 856.

markets, although not entirely comparable geographically, are considered the principal centrally located markets of the respective countries and as such, exercise an important influence on prices.

Canadian exports and imports of eggs throughout most of this period have tended to balance one another. The tariff during the past decade has been as follows: 1922, British Preferential 2 cents, Intermediate 2½, and General 3 cents; 1931, 2, 5 and 10 respectively. It will probably be agreed that this combination of factors has contributed to firm prices. It should be noted also that compulsory standardized grading has also been in effect during this period and has assisted in the maintenance of high prices

in Canada inasmuch as it has greatly improved quality and stimulated domestic consumption.

Exports of eggs from the United States amounted to 27,931,000 dozen in 1925-26 and 14,386,000 dozen in 1930-31 but these amounts are approximately balanced by importations of eggs in various forms. The tariff stood at 6 cents in 1921, 8 cents in 1922, and 10 cents in 1931. Thus trade and tariff conditions were similar to those obtaining in Canada. Under these circumstances, it is difficult to account for the higher Canadian prices except through improvements in quality and increased domestic consumption.

In comparing prices of any product, such as eggs, where perishability and freshness are important considerations, it is only fair to state that prices in certain markets which reflect a high degree of purchasing power and ability to pay premiums for a nearby product may be quite different from those in others, and out of line with generally prevailing prices.

Tobacco

Tobacco furnishes another illustration of the differences between average prices and prices of specific types of a particular product. When all types and grades of tobacco produced in each country are averaged the net result is a differential in favor of Canadian producers (Table 13), particularly in recent years. If only bright flue-cured prices are considered the comparison is even more favorable to Canada (Table 14). Prices of burley tobacco have, however, been higher in the United States.

In the case of Canadian bright flue-cured tobacco up until 1931 production did not exceed domestic requirements and prices were high under existing tariffs. However increased production, together with generally unsatisfactory economic conditions, has had the effect of reducing prices during the past two years.

Since burley tobacco, both in Canada and the United States, is more strictly a tobacco for domestic use its price depends in the greater part, upon the current year's production, available stocks of old burley and substitute grades of bright flue-cured. The supply and demand situation has been relatively more favorable to burley in the United States.

Canadian imports of tobacco have averaged around 17,000,000 pounds during each of the past ten years with exports averaging about 6,000,000 pounds since 1926. Tobacco production in Canada has expanded materially during the past decade. The United

States, on the other hand, is the world's largest producer and exporter of tobacco.

Since 1925 the British Government has granted a preference to Empire countries shipping tobacco to the United Kingdom which has amounted to two shillings halfpenny per pound of un-

TABLE 13. TOBACCO: ESTIMATED AVERAGE PRICE PER POUND RECEIVED BY PRODUCERS IN CANADA AND THE UNITED STATES

Year	*Canada*[1] cents	*United States*[2] cents	*Difference in favor of Canada*
1920	12.2	—	—
1921	18.1	19.9	—1.8
1922	17.5	23.2	—5.7
1923	16.5	19.9	—3.4
1924	23.3	20.7	2.6
1925	23.9	18.2	5.7
1926	25.6	18.2	7.4
1927	20.7	21.2	—0.5
1928	16.3	20.2	—3.9
1929	21.0	18.6	2.4
1930	19.2	12.9	6.3
1931	14.0	9.7	4.3

[1] Average prices paid producers, compiled by the Tobacco Division of the Experimental Farm, Ottawa.
[2] Yearbooks United States Department of Agriculture 1926, p. 1032, and 1932, p. 690.

manufactured unstemmed tobacco. During most of this period the Canadian tariff was 40 cents per pound on unmanufactured leaf.

The combined effect of preference, tariff and increased demand for Canadian tobacco to supply an expanding domestic market has resulted in a somewhat more favorable average price for Canadian grown tobacco in recent years.

TABLE 14.—TOBACCO: ESTIMATED COMPARATIVE FARM PRICES FOR BURLEY AND BRIGHT FLUE-CURED TOBACCO IN CANADA AND THE UNITED STATES[1]

Year	Bright Flue-Cured			Burley		
	Canada	United States	Difference in favor of Canada	Canada	United States	Difference in favor of United States
1928	31.0	17.9	13.1	11.1	29.6	18.5
1929	29.0	18.0	11.0	18.0	21.8	3.8
1930	32.0	12.0	20.0	15.0	15.4	0.4
1931	20.8	8.9	11.9	8.4	10.9	2.5
1932[2]	16.0	12.0	4.0	8.5	13.6	5.1

[1] Data for Canada compiled by Tobacco Division, Central Experimental Farm, Ottawa. United States data from Crops and Markets Vol. 6, No. 2, 1929 and Vol. 9, No. 1, 1932. Comparable data not available for earlier years.
[2] Preliminary estimates as of December 15, 1932.

Conclusions

Index numbers indicate that prices in general in Canada since the World War have averaged somewhat higher than those of the United States when both are compared with a pre-war base period. Likewise the prices of farm products have been main-

tained at a somewhat higher level. Whether there has been a net advantage to the producers of either country is not altogether clear but at least during the early part of the War and again since 1925 the Canadian farmer appears to have had some slight advantage when the relative levels of the prices of farm products and other commodities are compared.

Comparisons of the prices of specific products cannot be made in such general terms. Briefly stated, the relationship in each case is dependent upon conditions of supply and demand, tariffs and preferences. In the case of each country certain products are on an import or domestic price basis while others are on an export basis. A third group consists of products for which the net position varies from year to year or for which in any given year the volume of exports tend to balance imports. In connection with products exported some are affected by preferential tariffs in the country to which they are consigned.

In the United States flax, wool and cheese are quite definitely in the first group. These products are imported by the United States in substantial volume and are protected by tariffs. Prices received by producers have exceeded those secured by Canadian farmers. Under similar conditions the Canadian price of corn has averaged higher than that of the United States.

Wheat, beef and pork products are examples of commodities in the second group that are exported by each country. Here the general level tends to conform to the level of prices in export markets. Such differences as exist between Canadian and American prices for these products are due to seasonal and local demand conditions and to differences in quality of product. These differences have resulted in better average prices for hogs, but lower average prices for beef and beef products, and for wheat in Canada than in the United States. In this connection it may, and has happened, that producers of a given quality or type of wheat in certain areas of Canada, have received higher prices than producers of similar classes in the United States and vice versa, notwithstanding general averages to the contrary; it is probable that the same may be said of other products.

In the third group are products, such as lamb and mutton, butter and eggs. These products are both exported and imported by each country depending upon seasonal and cyclical production and upon other factors, but the heavy demand for fresh products in large consuming centers of the United States has insured higher prices for lamb, mutton and butter than prevail for simi-

lar products in Canada although in the case of eggs the reverse is true. The reason for higher Canadian prices for eggs may be found in the effect of grading on quality and consumption.

Finally we have in tobacco an instance of a commodity exported by both countries but meeting different competitive conditions abroad due to a tariff preference accorded the Canadian product in United Kingdom markets. This condition coupled with a protective tariff and an increasing demand for Canadian tobacco by domestic manufacturers has resulted in a better price to Canadian producers than that obtained by farmers in the United States. It is of interest to note that the number of products of British Empire origin to which tariff preferences have been extended by the British Government was greatly increased at the recent Ottawa Conference.

In such a brief analysis of prices it is dangerous to generalize or draw conclusions. One must, however, recognize that Canada exports larger quantities of agricultural produce per capita than does the United States. This is but another way of saying that the farmers of the United States have access to a larger consuming population within their own national boundaries. The number of products which are on an import basis, or on a basis which insures a protected market is probably larger for the United States than for Canada. Canadian producers, effectively barred from taking advantage of this nearby favorable market have turned their attention toward improvement of quality, development of domestic markets and an expansion of Empire trade through the medium of preferential tariffs and trade agreements. Students of marketing will undoubtedly follow the results of this undertaking with considerable interest.

Discussion by Harald S. Patton

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Dr. Booth's paper has afforded a suggestive comparison of prices of competing farm products in two contiguous countries, both on an export basis for foodstuffs in general, and both occupying a similar geographic position with respect to European markets. Each country, moreover, under normal conditions, constitutes an important market for the agricultural products of the other.

Dr. Booth's tables show that farmers in each country have enjoyed a price advantage in respect to products in which domestic consumption exceeds domestic production, and on which therefore the tariff might be expected to be effective. Thus American farmers receive higher prices for flaxseed, wool and cheese, of which Canada is an exporter,

while Canadian farmers are shown to obtain higher prices for corn and eggs. All this is in accordance with the implications of economic theory, and while it would be interesting to compare the price differential with the tariff duty in each case, I propose to limit my remarks to the situation in respect to commodities of which both countries are on an export basis.

While the United States and Canada compete with each other in world markets for such products as wheat, coarse grains, beef, bacon and ham, apples, and canned foodstuffs, Canadian farmers are relatively more dependent on the American market than are American farmers on the Canadian market, especially in respect to livestock. In the last year of the operation of the Underwood Tariff (1920), with artificial restrictions on agricultural commerce at a minimum, exports of Canadian foodstuffs to the United States were equivalent to $21 per capita (Canada), while corresponding exports of American farm produce to Canada amounted to $2 per capita (U.S.).

While the farmers of both countries have been severely affected by the drastic curtailment in overseas agricultural imports during the depression, it might be expected in view of the above situation, that the progressive closing of the American market by the mounting barriers raised successively by the Fordney Emergency Tariff (1921), the Fordney-McCumber Tariff (1922), and the Smoot-Hawley Tariff (1930), would be reflected in a greater decline in the prices of farm export commodities in Canadian than in United States market. Dr. Booth's tables indicate, however, a divided situation. While prices of cattle, sheep, beef and butter have been generally lower on Canadian markets, Canadian producers have received higher returns for hogs and tobacco.

The charts presented would seem to warrant the inference that those products for whose surplus disposition Canada had depended chiefly on United States markets, and of which American exports bear a low ratio to domestic consumption (e.g. beef and butter), command, under shelter of the tariff, higher average prices in this country. On the other hand, products of which the export surplus constitutes a considerably higher percentage of domestic production in the United States than in Canada (such as hog products and tobacco), yield higher prices in the markets of the latter country.

In the case of wheat the advantage again appears to be divided. In most years hard spring wheats (in which the United States is on deficit basis) command higher prices in Minneapolis than in Winnipeg. As a result, however, of the action taken by the Canadian Parliament in 1922 in restoring railroad freight rates on wheat to pre-war schedules, the difference between primary market and country shipping point prices is found on the average to be about one-third less in Western Canada than in United States territory for comparable distances and conditions. This differential is directly reflected in growers' returns. Since the hard red winter wheat area of the Southwest has now become the principal source of United States wheat exports, the Kansas City market probably reflects world prices more truly than Minneapolis or Chicago. Except during the period of the wheat stabilisation operations of the Federal Farm Board in 1930-31, Winnipeg prices have stood substantially above Kansas City quotations. In recent months the difference has averaged between 7 and 10

cents, this margin reflecting in part a quality differential and in part an exchange differential. American wheat growers thus appear to enjoy a price advantage with respect to varieties in which the output is absorbed in domestic consumption, while Canadian growers are at some advantage in regard to export varieties.

The adverse effect on Canadian farm producers of rising American tariffs has been mitigated, and in some cases, more than offset, mainly by two developments. The first is to be found in the efforts made by Canada to develop, and to adjust her production to, alternative export outlets, especially in the British market. The second factor, operative during the past two years, has been the indirect export advantage arising from the lower value on the foreign exchanges of the Canadian dollar in comparison with the United States dollar.

When Canada's extensive export trade in cattle to United States markets was struck down by the Fordney Tariff, a measure of compensation was obtained through securing, after determined pressure, a relaxation of the long-standing British embargo on importation of Canadian cattle for finishing on English and Scottish farms. In 1925 upwards of 110,000 head of Canadian cattle were exported to Great Britain. For some years, thereafter, rising prices in United States markets made shipment to this country more profitable, despite the Fordney-McCumber specific duties. With higher rates under the 1930 tariff act, accompanying falling prices in United States markets, overseas exports were resumed in 1930, a movement further stimulated by recent British penalty restrictions on Irish cattle. Similarly, the Fordney restrictions on hogs and hog products caused Canadian swine producers and packers to turn to the British market. Recognising the preference of English consumers for the Wiltshire side, the Canadian Department of Agriculture instituted in 1922 a rigid government grading policy, and secured an arrangement between packers and producers, whereby the former agreed to pay a premium on hogs grading "select" in accordance with British consumer preference. Canadian exports of bacon and ham to Great Britain, being exempt from the new British duties, rose from 3,000,000 lbs. for the first six months of 1931 to 14,000,000 lbs. for the first half of 1932. Under the Ottawa agreements a duty free quota of 2,500,000 cwt. is allowed on bacon and hams from Canada.

Canadian initiative in convening the Imperial Economic Conference at Ottawa last summer was largely actuated by the desire to have its preferential position in the British market confirmed and extended, as compensation for its exclusion from the United States markets. While the exemption of Canadian wheats, meats, tobacco, apples, butter, condensed milk, canned fruits and vegetables, from the various duties applicable to such produce from the United States, will not likely be reflected in differential returns to Canadian over American exporters to the amount of such duties, the new preferential system may be expected to increase Canada's share of British food imports at the expense of American producers, and thus aggravate the pressure of supplies on our domestic markets.

It would thus appear that Canadian commercial policy, through exploiting the position of the Dominion in the British Empire, and through

using its Intermediate Tariff as a bargaining device with non-Empire countries—is following a course which not only mitigates United States tariff restrictions, but also contributes to giving Canadian farmers a volume and price advantage over United States producers in overseas agricultural export trade.

The varying rates of discount at which the Canadian dollar has been quoted in New York during the past two years—reflecting, as they have, the balance of payments with United States, and its interdependence with sterling exchange, rather than any internal depreciation—have served as a partial offset to tariff restrictions in United States and other countries whose currencies remain on a gold parity. In the case of commodities—such as wheat, bacon and tobacco—in which Canada and United States compete as sellers in the British market, the exchange situation means that the sterling proceeds yield a larger return in Canadian than in United States dollars, and thus tends to favor Canadian exports. In this connection, it may be noted that during the first four months of the current crop year Canadian exports of wheat amounted to 134,000,000 bushels, while only 18,000,000 bushels moved out of American ports. On the other hand, since sterling itself, has been at a discount of 20 per cent or more in terms of the Canadian dollar, the exchange factor has placed Canadian exporters at a disadvantage with competitors in countries such as Australia and Argentina, whose currencies have been at a discount in terms of sterling. (In October 1932 the average United States exchange value of the Australian pound was $2.71, and of the Argentine peso, 58 cents.) This situation has led the farmers of Western Canada to urge the Dominion Government to allow the Canadian dollar to fall to a parity with sterling. It thus appears that the exchange factor is tending, on the one hand, to mitigate the effect of the high agricultural tariff, protecting the United States market, and, on the other hand, to lessen the preferential tariff advantage which Canada enjoys in the British market.

With Great Britain still the world's greatest agricultural importer, every decline in sterling exchange is reflected in the prices of cotton and wheat in United States export markets. Instead of gold imports tending to raise prices in this country, the immediate effect is to depress further the prices of international staples, in so far as such gold imports involve a reduction in the monetary reserves and a fall in the exchange rates of countries which are the principal importers of primary products. Any relief to American tax payers through insistence on war debt payments involves a greater and more concentrated loss to our exporters.

REVIEW OF CURRENT FARM TAXATION RESEARCH[1]

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Taxation of farm property has long been vaxatious to the farmer. It was the practice to pluck the goose which squawked least. The goose who squawked least was the farmer. He squawked least, not because he liked the plucking, but because he was used to being plucked. Then, too, he could not prove that he was being plucked any more industriously than any other economic group. As long as there were any feathers left, the farm goose submitted to the plucking in the belief that the feathers were being put to good use. The almost complete failure of the feather crop in 1921 caused him to squawk in earnest. That failure, combined with the increased demand for feathers, made the pluckings of 1921 and 1922 take on aspects of a flaying.

For some decades agriculture has been accustomed to submitting its ills to the agricultural colleges and the U. S. Department of Agriculture. Naturally, the farmer turned to these agencies in his new form of distress. When the farmer raises his voice, the agricultural colleges, the U. S. Department of Agriculture, and the farm organizations listen. It is their master's voice.

The Origin of Farm Taxation Research in the United States

In January of 1923, the Division of Land Economics of the U. S. Department of Agriculture set about to find the basis of the trouble. Professor J. T. Sanders, now head of the Department of Agricultural Economics of Oklahoma Agricultural and Mechanical College, in cooperation with Professor C. O. Brannen of the Division of Agricultural Finance, now head of the Department of Agricultural Economics of Arkansas, cooperated in a study of the relationship between cash rent and taxation. The data for this study were obtained from the 1920 census, and covered 31 counties in 26 states. The study was published as a mimeographed report.

In the fall of 1923, Mr. Wayne Newton, now of the State Commission of Inquiry into County, Township, and School District Government of Michigan, made a trip through the Middle West discussing details of a project to investigate farm taxation with

[1] This paper was read at the Twenty-third Annual Meeting of the American Farm Economic Association, Cincinnati, Ohio, December 29, 1932.

the departments of agricultural economics. Some of the experiment stations were already engaged in research in farm taxation. In Kansas, Mr. Newton found that Professor Eric Englund was already underway with a study of farm taxation. In Texas, Professor F. A. Buechel, in cooperation with the Bureau of Agricultural Economics, was making a study of the per acre taxation of farm land in Texas. The Department of Agriculture initiated new studies in farm taxation and provided a background of experience and training in this new kind of research.

The passage of the Purnell Act in 1925 provided the funds needed. Funds for research in agricultural economics were severely restricted before the passage of that act, but with its passage and the continued support from the Federal Government, many of the stations began tax investigations.

The advisory committee on Agriculture in the publication "Research in Public Finance in Relation to Agriculture" published in 1930, classified the existing farm taxation research by detailed objects of attack. Some of the research was properly classified under several projects. It has been two years since the publication of that monograph, and it is now possible to discern trends of taxation research, particularly as conducted by experiment stations.

Historical Classification of Experiment Station Studies

Historically, the investigations of the experiment stations may be divided into three groups: orientation studies, local government studies, and state government studies. Each of these groups may be subdivided.

a. *Orientation Studies.*—An examination of the orientation studies is first in order.

1. "Public Finance in Relation to Agriculture," Project No. 1, outlines such a study. It was the first type undertaken by the following states: Colorado, Louisiana, Michigan, Minnesota, Missouri, New York, Oklahoma, and South Carolina. In practically all of these states there was a specialist in public finance in charge, or the work was done jointly with the Division of Agricultural Finance, in which there was such a specialist.

2. Farm Tax Burden Studies: The second subdivision of these orientation studies has for its object the measurement of the tax burden imposed upon farmers. The burden was usually expressed as a per cent of the farmer's net income paid in taxes. The following states began their investigations of farm taxation with this type of study: Arkansas, Kentucky, Maryland, Ohio,

Pennsylvania, and Virginia. This type of study followed the first type in Colorado, Louisiana, Missouri, and South Carolina. These studies showed that the tax burden was heavy, that taxes had risen more than other expenses, and much faster than the index of farm prices.

Up to this time there had been little investigation of taxation from the standpoint of agriculture. It was felt in the stations that the tax investigators must adhere rather closely to an investigation of the taxation of agriculture alone to justify the use of funds appropriated for the investigation of agricultural problems.

3. Ratio of Assessment Studies: About this time the first of the reports of Mr. Eric Englund was published. It was called "Assessment and Equalization of Real Property in Kansas." It was so well done that it attracted much favorable comment. It dealt with one of the fundamental causes of the squawking of farmers, the inequality of assessments. This study was the first of a series of investigations of the relation between assessed value and sale value.

4. Status of Farmers' Taxation: Another method of orientation is portrayed in those publications called "Status of Taxation." These studies were frankly introductory explorations of the field. They came from Arkansas, Colorado, South Carolina, Iowa, South Dakota, and Utah.

b. *Local Government Studies.*—The second group of studies by the experiment stations was pointed to by the first type. It was usually found that the immediate cause of the excessive plucking was the cost of local governments. The local governments held responsible for high taxes were the counties and the school districts.

After the orientation studies were completed, the following states undertook the studies of the financial affairs of these local governments: Arkansas, Colorado, Delaware, Maryland, Michigan, Ohio, Oregon, Pennsylvania, Tennessee, Virginia, and Wisconsin. In most cases the facts found were that the county governments were territorially incompetent to tax upon a large enough area to distribute the burdens equitably, (1) in proportion to benefits, or (2) in proportion to ability to bear the burdens, and (3) that the local governments were still endeavoring to operate a system of government designed during the ox-cart era of transportation, when the taxable wealth consisted solely of land.

Most of these studies showed the local application of facts well

known to all versed in public finance. That the distribution of tax burdens for schools should be equalized on a state-wide basis, is nothing new, but little was done about it. Few facts were available. That county governments can not efficiently operate, is nothing new, but the extent of their inefficiency had not been attacked.

c. *Studies of State Financial Structures.*—A third phase of the tax studies was in turn pointed to the local governmental studies. It does little good to point out that the school system needs new pillars of support, unless new pillars can be shown as available to support the schools. If not available, the alternatives are only two: (1) continue to bear the burden, or (2) cut down on the expenditures of the schools. The first caused the squawking. That the second alternative was worse than the first, is proved because the farmers were bearing the burden.

The third type of tax study is requiring something of an orientation again because the investigator must, in most cases, compile from official reports, a coordinated and simple presentation of the facts of state finance. It must be simple to be able to command attention. The states which are now attacking the problem of state finance are the following: Colorado, Delaware, and New York.

Contemporary Farm Tax Research

A. *In Experiment Stations*

1. The following states are now engaged in measuring the relation between farm taxes and farm incomes, or taxes on farmers in proportion to their incomes, as contrasted with taxes on other economic groups as contrasted to incomes:

Louisiana—Relation of taxes to incomes of various occupational groups.
South Carolina—Comparison of percentage of net incomes paid in taxes by different occupational groups.

2. The following states are now engaged in the study of some phase of farm real estate taxation:

Kentucky—Farm real estate taxation.
Texas—Inequalities due to scope and method of assessment of real estate.
Minnesota—Methods of assessment of real estate.
Missouri is engaged in the study of "Some Aspects of the Rural Tax Problem in Missouri."
Oklahoma has for some time past gathered data upon the amount of and trend of farm taxes. It is not a major project.

3. The following states are now making studies of local governments:

a. Studies of County Governments

Arkansas—Receipts, expenses, organization, and services of country governments.
Colorado—Consolidation of counties and functions, cost of county administration and operation.
Maryland—Receipts and expenditures, efficiency of county governments, tax delinquency, and tax reform.
Michigan—Study of protective functions of county government, and possibility of reorganization.
Ohio—Analysis of support of government in a rural area with much marginal land.
Pennsylvania—Cost of local government.
Tennessee—County consolidation.
Wisconsin—Changes in form and function of local governments, with a view of reducing expenditures.
New York—The cost of local government.

b. School Districts

Michigan—Organizations, administration, and costs of school districts.
Oregon—Incidence of school taxes.
New York—Rural school costs and taxes in New York.

c. State Tax Systems

Colorado
Delaware
New York

The studies of county governments bid fair to explore the so-called "Dark Continent" of American government by laying bare the financial and administrative affairs of these governments nearest to farmers. The investigations heretofore have been confined almost exclusively to the legal aspects of county governments.

The investigation of school costs is another phase of investigation of local governments now under way. The chief causes of the increased taxes on farm property are the local school and road taxes. In Colorado, Michigan and Oregon the problem is, first, to show the amount of taxes levied upon farm property for school purposes, and, second, to devise a system of equalization of school support so that the farmer shall not be discriminated against.

The second important source of the increase of farm taxes is the levy for roads. With the coming of the automobile, this levy on land has been exceedingly onerous, and is being attacked

from two directions, from that of the reorganization of the county government, and second, by monographs on the subject of financing the highways. A publication from Wisconsin, called "Who Pays for the Roads?", is an example of a monographic attack upon a most vexatious problem, that of paying for the roads in proportion to use of them.

B. Contemporary Tax Research in the Bureau of Agricultural Economics

1. The Division of Agricultural Finance is constructing an index number of taxes on farm property from 1913 to date. The process of gathering these data consists of sampling the same scattered farms in each county in the United States from 1913 to date. These data have been published for many of the states and will shortly be complete for all the states.

2. In cooperation with the Rural Life Division of the Bureau, the Division of Agricultural Finance is now studying the possibilities for farm tax reduction through the reorganization of local governments. This work is being started in two states, Wisconsin and Montana, and it is contemplated that it shall extend to six or seven others as immediate goals.

3. One of the important problems of farm taxes is that of regression. In cooperation with the Bureau of the Census, the Bureau of Agricultural Economics has obtained data from 100 counties to ascertain the relationship between value of property and amount of taxes, and to ascertain the relationship between size of farms measured in acres and amount of taxes paid. It is contemplated that some counties in the United States will be sampled to ascertain relationship between net rent and amount of taxes.

4. The Department is now sending out schedules to get a measure of farm tax delinquency changes.

5. It is contemplated that a cooperative effort shall be taken with the land utilization group to assist in assembling public finance data to ascertain their influence upon a change of land use.

6. It is contemplated that the study which resulted in the bulletin entitled "The Taxation of Farm Property," by Whitney Combs, will be continued and that similar bulletins will be published from time to time.

7. The fiscal structures of the various states are being examined to find causal relationships between the index of farm property taxation and the state fiscal structure.

It is contemplated that the results and research in regard to

the amount and trend of farm taxes shall be used to show: (1) The relation between those trends and the financial systems of the various states; (2) the importance of the reorganization of local government, and (3) relationship between farm tax delinquency and farm land utilization, (a means of using tax systems to induce a change of land utilization).

The cooperation with the states in the investigation of the farm tax situation rests on two bases: (1) The Bureau to some extent suplements the financial resources of the state experiment stations, (2) The Division has information of the activities of all the states engaged in this research and is able to bring to a new project an accumulation of experience.

Special Investigations by Tax Commissions

A questionnaire to the state tax commissions uncovered a surprising amount of research conducted by those official bodies. Very little of the research, however, is aimed directly at disclosing the position of the farmer in the tax structure. Most of the research reaches the farmer's position by indirection. A conspicuous instance of this indirection is the publication "The Geographical Problem in Wisconsin Taxation" by J. Ray Blaugh, of the Wisconsin Tax Commission. In that publication some of the fundamental questions of the old subject of "Taxation and Ability to Pay" and "Need and Ability to Support" are attacked. The farmer's position in the tax gathering and distributing system of the state is shown by indirection. Most of the research done by tax commissions is conducted with one of two objects in mind, (1) to summarize the whole tax situation in a state, or (2) a special study of the taxation of a particular industry.

An example of the first may be cited in the case of Mississippi. Mississippi found itself in a bad financial muddle and set up a committee with an appropriation of $150,000 for the purpose of finding a solution to its fiscal problems. The committee obtained the services of the Brookings Institution to conduct a study. The result is a ponderous volume of 971 pages setting forth in detail the facts of Mississippi state and local government. Many discussions of the farmer's position may be found, particularly in the section upon the general property tax. In this study the whole of the state government, including its subsidiaries, the counties, are put under the microscope. Definite and far-reaching reforms are proposed.

As an example of the second type of research may be cited

the studies of the "Bank Tax Commission" of Minnesota. The object of most of the special investigating bodies is to study a particular phase of the state's tax system. The State Tax Commission of North Carolina is now engaged in a study of "The Burden of Property Tax on Agriculture." It has not yet come from the press.

Tax Research by Farm Organizations

The farm organizations do a kind of research which is designed for immediate use. Their tax philosophy for public consumption can be epitomized from the statements of the New York State Farm Bureau:

1. That taxation should be derived from various sources of wealth according to ability to pay.
2. That taxation should be derived according to the benefits derived.
3. That tax revenues should be allocated to the various localities according to needs.

These principles are accepted by the general population, and their directness is highly valuable.

Some of the farm organizations are very active in promoting the welfare of their members by investigating the tax situation as it directly affects them. Mr. John C. Watson, of the Illinois Agricultural Association, has supplied the information from which it is possible to make the following summary.

A. Tax Burden Studies

The gathering and presentation of facts showing the relation between income and taxes paid is one of the favorite activities of the farm organizations. The California Farm Bureau, The Illinois Agricultural Association, the New York State Farm Bureau, and others have been active in this field. These studies are usually made by the use of secondary sources of information, and always show that the proportion of the whole tax bill paid by the farmer is much larger than his proportion of the whole income.

B. Equality of Assessments

One of the active projects is that of obtaining the same ratio of assessment for farm property as for other property. To this end the Illinois Agricultural Association conducts local studies of the relation between sale values and assessed values. It has achieved some notable results.

C. Local Government Studies

As in the experiment stations, the farm organizations have found that a profitable place of attack is that of local government. California, Illinois and Indiana have been most active in that field, studying county budgets on an extensive scale.

D. Functional Studies

The farmer's tax bill is largely made up of the levy for schools and roads. The farm organizations maintaining research bureaus are active in obtaining facts upon which to advocate an equalization of the tax burden for these functions. Again California, Illinois and New York are the leaders in this kind of investigation, and they have achieved some large tax reductions for there membership.

Other Farm Tax Research

An example of the coordination of the investigation of the farm tax problem with the investigation of the problems of the whole complex of group relationship may be found in the recent publication of "Taxation in Minnesota," by Roy G. Blakey and associates. This study devotes two chapters directly to the consideration of the farm tax problem in its chapters on the ratio of assessment to sale value, and the tax burden on agriculture. Other chapters consider the problem indirectly. The study comprises some six hundred pages. Few organizations have at the same time the funds and the experience to conduct such an investigation.

Reports of 27 special tax commissions were examined, but in none of them were there found any special investigations of the farm tax situation. In practically all of them there are statements that real estate is over-taxed, etc. The exceptional study was made in North Carolina, and that study showed the farm taxation situation. The Ohio report for 1926 and subsequent reports referred to the tax levy on farm property and the index number of farm prices, but it was little more than mentioned.

Conclusion

It may be said that the investigators thus far have not discovered new principles of public finance, that their work has been of the technical, clerical kind. That may be so, but how much time need be spent in the discovery of new principles when practice is so far behind theory? The facts are new, and if principles

are proved anew in each state, that proof provides a practical basis for intelligent action. In a legislative hearing, a sorry spectacle is presented if the proposed remedy is not supported with facts.

Those of us who have been engaged in taxation research for some time will agree, I believe, that the solution of the farmer's tax problem in a given state is dependent upon a solution of the whole tax problem. Yet the fact-gathering research upon a scale grand enough to throw sufficient light upon the intricate and numerous relations between the state and its subsidiaries is beyond our financial resources, if not beyond our enthusiasm. We must limit ourselves, it seems, to research based upon, first, investigations of problems in which there is immediate need of information. This problem should be selected not upon the basis of the success that some colleague has attained by an investigation of that field, but upon the immediate need for information. A second consideration for the choice of projects is the competence of the investigator to gather information upon a large enough scale to present the many sided considerations necessary to tax reform which will do justice to all parties interested.

Then, it seems to me that there are fertile fields in tax research along monographical lines to show the following things: (1) The facts of taxation and expenditures of the political divisions upon a geographical basis not too large for the investigator of limited financial resources to deal with adequately. The investigator is less than half through when he does not present benefits received as well as taxes paid. (2) Monographical investigations of specific expenditures of the important functions of government for which agriculture is taxed. An example of this kind of research is the bulletin from Wisconsin, entitled "Who Pays for the Roads?" In these investigations it will frequently be necessary to cut across political boundary lines.

Taxation buys both consumption and production goods. Specifically, in any functional analysis of expenditures what are the goods purchased? Are they consumption of production goods? What are the principles underlying the limitations on the desire or the need for the goods purchased? The answer to these questions carries us into economic theory, a phase of taxation research which has been almost eschewed in late years.

The old masters have left us many analyses of the economic theories of tax collections, but few applications of economic theories of tax expenditures. The economic theory of tax spending is almost an unexplored field.

A PROGRAM OF RESEARCH BASIC TO STATE INCOME TAX LEGISLATION AS IT AFFECTS AGRICULTURE[1]

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All state income tax legislation affects agriculture. Such legislation provides for the public collection and the public expenditure of a fund from a levy on incomes. Agriculture, therefore, must be affected either by the collection or by the expenditure of this fund. The amount involved may be large or small; the effects entailed may be direct or roundabout; but the farmer pays or receives, or both.

It follows that since any contribution to the provisions of a state income tax law would affect agriculture, all possible contributions are relevant for discussion here. Nevertheless, certain aspects of income tax legislation, though not limited in their effects to agriculture, are of marked significance to that industry. It is proposed to indicate these aspects as subjects for a program of research.

Preliminary to this task, certain assumptions should be made in order to delimit the portion of the field to be treated here. It is assumed that a state personal income tax law is to be passed; that the provisions of this act have been drawn with care; that the tax is to be levied at graduated rates; and, that the new law is to be administered by an able tax commission with full powers. In substance, a state personal income tax law embodying the best of modern tax thought is proposed. There is small use in proposing less than the best. Research should begin with the farthest limit of the known and then proceed to the unknown. For purposes of this paper, the problem then becomes one of indicating those aspects of the law that are of particular significance for agriculture and of suggesting research concerning them.

Such aspects may be conveniently classified under three main headings: The collection of this revenue; its distribution; and the relation of the income tax to the property tax. Each of these will be examined in turn.

Assuming, as has been done, a levy at graduated rates, the collection or revenue division of a state personal income tax law is of especial concern to farmers at three points: The concept of

[1] This paper was read at the Twenty-third Annual Meeting of the American Farm Economic Association, Cincinnati, Ohio, December 29, 1932.

net income adopted for purposes of taxation; the personal exemption allowed; and the manner of administration. In view of the present low level of farm income these revenue considerations may seem academic. But a state income tax law is usually a permanent revenue instrument and a depression does not last forever. Thus in the development of state income taxation, long-run matters such as these are of importance.

The farmer who pays a personal income tax is concerned that the net income on which he is taxed shall be a true net income, one which registers accurately his earnings in the business of farming. It is to his interest that the items included in gross income and the deductions therefrom be proper to the business of agriculture in order that a true net income be obtained. In writing this section of a state income tax law, the classification of income and expenditure used in farm cost accounting is of great value. Although certain variations from the system of farm cost accounting are inevitable because of differences in the objectives of farm cost accounting and income taxation, a definition of net income derived from farm cost accounting will be a true one for the business of agriculture. The matter of deriving such a definition and then of relating it to the objective of personal income taxation offers a problem for research.

The personal exemption allowed by a state income tax law is of large concern to agriculture in two ways. The farm owner has an investment in real estate on which he pays a heavy property tax. This tax is based on the value of the property, not on its income, and both because of its size and the basis on which it is levied this tax is a heavy burden. The farmer, therefore, is interested in the collection of large revenues from state income taxation which may be used to lower his property tax or, at least, to slow the rate of its increase. At present, federal rates of personal income taxation reach a maximum of 63 per cent for the largest incomes. Thus it is evident that if the states are ever to derive large revenues from personal income taxation, the smaller incomes will have to be taxed. This means that the personal exemption from the tax will have to be low.

The farm owner finds his true interest also in the ultimate placing of the property tax levy on a property income basis. A most significant step toward this achievement would be taken if farmers as a class became accustomed to the payment of income taxes and to the keeping of accounts and the making of reports entailed by this method of taxation. In this, as in so many

other matters, the way to begin is to begin. A personal income tax exemption so low that during years of average prosperity most farm owners would pay an income tax, provides a most excellent beginning.

In order to accomplish this end of effective taxation of the lower incomes, research into the size distribution of these incomes, their sources, and the manner of administration best adapted to taxing them, is desirable. The studies of income made by the National Bureau of Economic Research and other organizations offer a beginning in fact and method for the classification of the lower incomes by size and source groups. In the matter of administration, the possibility of a system of reporting wage and rental incomes at the source should be examined. For small business incomes, the chief reliance of the income tax administration would probably be on an intensive examination of sample returns. But the development of objective indicia of income would be most useful and a worthy task for the research worker.

Essentials to the effective taxation of income from farming are an income tax blank suited to that industry and objective indicia of income. The extension worker, the farm cost accountant, the taker of survey records, indeed all workers in agricultural fields who have direct contact with farmers, are sources of information for the student who would develop an income tax blank suited to taxing farmers. Soil survey maps, land utilization studies, farm cost account records, and farm management surveys together with index numbers of the prices of farm products and their costs of production offer a mine of material for the development of objective indicia of probable income from farming.

But whatever methods be used for the taxation of the lower incomes, for such taxation to be successful, it is probable that much use will have to be made of educational channels. In general, state income tax administration is a matter of rules and of men to enforce these rules, not an agency of education. With a good law and an able tax commission to enforce it, this arrangement works well under the present conditions of high personal exemptions and relatively few income tax payers. But it would probably not be so effective with a low personal exemption and many income tax payers. Under such conditions, it might be that deviations from honesty would be less serious than mistakes from ignorance. Research in the manner of best administering such a tax should not be limited to the type of schedule and the meth-

ods of checking the accuracy of the returns but should include a study of the problem of how best to inform a whole population regarding the essentials of income taxation.

The question of the distribution of revenue collected under an income tax so conceived is to be solved only with reference to the particular situation of the state adopting this tax. If such a tax be a substitute for some other state tax, as, for example, the state levy on property, then clearly revenues collected under it should go to the state. If, however, it be an additional source, the problem becomes more complicated. Should this *additional* revenue go to the support or to the creation of some activity of large general public interest administered by the state government? Should it be distributed as a whole or in part to local units in the form of grants-in-aid? Or, should this distribution to local units be in the form of shared revenues? These are not easy questions. Nevertheless, they are the very questions that must be answered in any real investigation of the best use of income tax revenues.

A beginning may be made by recognizing the essential facts of the problem. The state government finds its ultimate justification in the making of laws and the administration of services of general public interest. But not all matters of general public interest are entrusted to the state government. A large element of general public interest inheres in the satisfactory performance of certain services administered by local units of government. For example, as far as education is a matter of general public interest, an ineffective school handicaps the state as a whole through the persons who leave its doors ill-trained. Again, so far as the speedy and free movement of persons and commodities over the state is desirable to its development, local neglect adquately to maintain a road operates as a hindrance. Grants-in-aid are given in recognition of this general public interest in various local governmental enterprises. They are but the financial expression of this interest. Shared revenues on the other hand arise out of considerations of efficiency. The state can collect certain revenues not available to local units, which, however, have some claim to this revenue because it is local to them.

In attacking the problem of the best use of income tax revenue, the first question is whether the general public interest as served by the state or as served by local units in their administration of enterprises of public interest is cared for adequately. If not, then revenue from income taxation should be kept by the state or should be distributed in the form of grants-in-aid. For the gen-

eral public interest clearly outranks local interests. If, however, the state is caring adequately for the matters of public interest administered by it and if enterprises of general public interest administered locally are adequately supported through grants-in-aid, the revenues from the state income tax should be shared with local units.

But how tell whether the public interest is adequately served? For this question, there can be no absolute answer. It is a matter of relative need as recognized at the time. For example, if on investigation, it be determined that the schools and roads in a given state are not so effective for purposes of education and travel, respectively, as are the schools and roads in other states with which this state may properly be compared, then perhaps revenue from a state income tax should be spent for roads and schools, either directly by the state or by local units through the medium of grants-in-aid. The question which channel of expenditure should be chosen is one of the relative administrative effectiveness of the state and local units for the purposes to be served.

If, on the other hand, the schools, roads or other activities of large public interest are fully as effective in this state as elsewhere, it would appear that the revenue from a state income tax should be shared with local units. Questions which now follow are: On what basis should this revenue be shared? How should it be divided between the state and the units of local government? What local units should participate in this division?

The basis on which this revenue should be shared depends on the fundamental reason for the state-collection of an income tax, namely, efficiency in administration. The local unit might conceivably collect such a tax from its citizens yet does not because the state is better able to collect it. Hence it follows that the division of this revenue between the state and local units should be based on the contribution of the local units to it.

On what terms should this division be? What should be the share of the state and that of the local units? The state clearly should be reimbursed for all expenses of collection before the proceeds of any tax are shared with units of local government. The local units, clearly, should receive no more than they contribute to this revenue, since their claim to a share is based on their contribution. Within the limit prescribed by the contribution of local units, the relative revenue needs of the state and the local units should determine the terms of the division. This relative need for revenue offers a nice problem for research.

One method of approach to it would be through a comparison of relative burdens of taxation, the sources taxed being credited with benefits received in order to obtain the true net burdens. Thus, if local governments are obliged to lay heavy burdens on the property source to meet their need for revenue, and if the state government lays but light burdens on its sources, the presumption is that the local units need additional revenue for the relief of their source of taxation more than the state—assuming that local units are no more wasteful than the state and that the difference in burdens of taxation is not due to a relatively greater rate of debt payment by local units or to a relatively greater rate of borrowing by the state.

The view that local units should share on the basis of their contribution would seem to indicate, at first thought, that the best distribution of the proceeds of a shared income tax would be among the smaller units of local government with each township, village, school district or other small political unit a recipient of shared revenues. This solution, however, neglects an important consideration. The choice of units to receive shared revenues depends somewhat on whether it is intended to encourage or to discourage the continued existence of a given size of unit. For example, if it be wise public policy to encourage the expansion of functions performed by large units, then one way of accomplishing this end is to make such units the sole local recipients of shared revenues. The research problem here is largely one of determining what public policy should obtain. This in turn is a question of the relative administrative efficiency of large and small units of government.

The third and last division of the field of research to be examined here is the relation of the state income tax to the property tax. Heavy and mounting burdens of farm property taxation with the consequent demand for relief emphasize the significance of this division of the problem to agriculture. Three of its principal aspects are: Shared revenue; the elimination of the state levy on property; and the property tax offset.

In the discussion of shared revenue, it was pointed out that income tax revenue received by local units may well make possible a lowering of the levy on property and that whether this should be done or not is a question of relative net burdens of taxation. The issue in this division, then, is not what ought to be done but rather what is the best means to accomplish a given end. Assuming that the property tax levy should be reduced, is the distribution of shared revenue from income taxation the

best means, or should this reduction be accomplished by elimination of the state levy on property, or by the property tax offset?

Each of these ways of granting relief to the property owner, if it does so at all, accomplishes this end through a different distribution of aid. Shared revenue relieves local units in proportion to income taxes collected from their citizens, or should. Elimination of the state levy on property relieves them of taxes in proportion to the value of their property—assuming an accurate equalization. The distribution of relief afforded by a property tax offset cannot be stated so simply since it is more complex. Such relief as this device offers, however, is of a still different order. Therefore, a choice from these three methods of granting relief, expresses ultimately preference for one distribution of benefits as compared with the other distributions. Thus research on this problem should first determine and then evaluate the distribution of benefits offered by each method.

The need for this approach is illustrated by consideration of that most plausible of devices, the property tax offset. With relief to the property owner a reason for passing state income tax legislation, the proposal that the property owner should be permitted to offset the income tax with property taxes paid appears to follow. Indeed, a number of states have an offset provision and in others the adoption of offset legislation is a live issue. But on the evidence of a statistical investigation, Professor H. D. Simpson finds that an unlimited property tax offset would have reduced the Wisconsin income tax revenue in 1928 by 51½ per cent; that the issue of a property tax offset is *not* between property owners and non-property owners but rather is to be found in the effects of this offset on the various classes of property owners; that farmers are among the heaviest losers from such an offset; and, that "the offset confers its largest relief in exactly the quarters where relief is least needed."[2] These conclusions support the position that the distribution of benefits from a property tax offset, whatever its type, should be examined most carefully before the adoption of such an offset by any state. Such research is of especial concern to agriculture.

A brief summary may serve to bind the strands of this discourse. Even under the best personal income tax law, agriculture is especially concerned with the collection of this revenue; its distribution; and the relation of the income tax to the property tax. Each of these aspects of state income tax legislation

[2] Simpson, Herbert D. *The Effects of a Property Tax Offset under an Income Tax.* Chicago. Institute for Economic Research, Northwestern University.

offers a group of problems for research. Under the collection of revenue, the farmer is interested that the personal exemption be low, the concept of net income be a true one for agriculture, and the manner of administration be effective in order that both he and others in the low income group pay an income tax. Under the distribution of revenue, the farmer is concerned that the general public interest as cared for by the state and by his own local governments be adequately served and that the two-way division of remaining revenues shared with local units be an equitable one. Last, in examining the relation of the income tax to the property tax, if income tax revenue is to be used to reduce property taxes, the farmer is concerned that the best of the three methods—shared revenues, elimination of the state levy on property, and the property tax offset—be chosen.

Discussion by Harold M. Groves

Wisconsin Tax Commission

Professor Kendrick began his paper with a very appropriate statement that any research which may throw light on the income tax is research which concerns agriculture. The income tax is the leading rival of the property tax in the revenue field. All of the criticisms leveled by farmers and friends of the farmers against the property tax fail by default, unless the critics can point to a more satisfactory alternative source of revenue. This alternative source must not only yield a large amount of revenue, but must supply it *where* the public expenditures are.

Professor Kendrick has made a very able analysis of the many problems within the income tax field concerning which further research would be helpful. He has not mentioned, however, a very important group of subjects which pertain to the proper place of the income tax in the revenue systems of the state and nation. He starts in by assuming that a state personal income tax is everywhere accepted. As a matter of fact, less than half the states in the Union give any place in their revenue systems to an income tax. On account of his assumption, Professor Kendrick leaves out of the picture such important subjects as the following:

Does the income tax limit and hamper the industrial development of territories which adopt it?

Would a federal credit for state income taxes be a desirable way of defeating opposition to the income tax on the ground that this tax frightens away industry?

Does the income tax result in increased expenditures by the state and its localities?

Is the income tax adapted to the needs of an agricultural state?

What is the present personal, occupational, and territorial distribution of wealth and income, and what are the effects of various taxes upon such distribution?

Other questions which concern the place of the income tax in the revenue system are the following:

What is the proper relation between state and federal income taxes?

Is it feasible for the national government to collect income taxes and distribute the proceeds to the states? If so, upon what principles should this distribution be made?

How definitely can the origin of income be determined, and what claim does a jurisdiction in which an income originated have to the exclusive right to tax that income?

What is the place of the income tax in the revenue systems of Europe and how is the European result achieved?

Is the income tax as a source of revenue less stable and elastic than the property tax or other taxes, and how can a larger element of stability and elasticity be achieved? (This is particularly timely in view of the depression, the dwindling revenues of the Federal Government and many of the states.)

How does the income tax compare with other taxes in its cost of administration and in the degree of delinquency which is experienced?

There has been a considerable tendency of late to analyze the tax problem from the point of view of the expenditure for a particular public function. Thus, studies are made of the revenue and expenditures for public highways and for public schools. A broader base of support for education and the use of the income tax to furnish the revenue are promising possibilities both for the legislator and the research student.

The paper being discussed very properly stresses the importance of personal exemptions under the income tax. It does not, however, mention other exemptions which are of equal importance—the exemption of corporate dividends, of capital losses, of the income from governmental securities and certain governmental positions, etc. If the income tax is to assume a larger place in the tax system, it must be an income tax with a broad base.

Among the most interesting and valuable of Professor Kendrick's recommendations are those concerning the relation of the income tax to the property tax and the need for further research on this subject. As he very well explains, the state can give property taxpayers relief in several alternative ways: through the elimination of state property taxes, sharing income taxes with the municipalities, and property tax offsets. It is possible, in addition, of course, for the state to take over functions now left to its municipalities and to finance these functions by means of the income tax. Professor Kendrick very well emphasizes that the effects of offsets upon the distribution of taxes is not well understood. In view of the increasing vogue of offset provisions in state income tax laws, this is becoming a matter of first rate significance and is well recommended for further study.

The success of the income tax in supplementing the property tax waits upon the improvement of the state income tax in many particulars. It also waits upon the adoption of the income tax in many states which still have no income tax at all. Both the proponents and the opponents of the income tax in these states need to know what effects it would have upon their taxpayers and how it can be fitted into their revenue systems. The research student could choose no more vital role than that of enlightening them.

FOREST TAX RESEARCH AS IT AFFECTS FARM TAXES[1]

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The belief that the general property tax is particularly ill-adapted to the forest industry has caused more than half of the states to enact special laws for the taxation of forest property. In 1923, the United States Senate appointed a committee on reforestation "to investigate problems relating to reforestation, with a view to establishing a comprehensive national policy for lands chiefly suited for timber production in order to insure a perpetual supply of timber for the use and necessities of the citizens of the United States".[2] After holding hearings in all of the important forest regions, this committee made a report which resulted in the passage in 1924 of the Clark-McNary Reforestation Act. Among other things, this law provided for a comprehensive federal investigation "to study the effects of tax laws, methods, and practices upon forest perpetuation", and "to cooperate with appropriate officials of the various states or other suitable agencies in such investigations and in devising tax laws designed to encourage the conservation and growing of timber".[3] The study thus authorized, the most ambitious of its kind ever undertaken in this country, was started in April, 1926, and is now nearing completion.

In considering the relation of this kind of research to farm taxes, it is of some interest to note its purpose. The problem which induced Congress to appropriate hundreds of thousands of dollars for a forest tax study was the threatened exhaustion of forest resources, and the question of whether or not public policy with respect to taxation conflicts with the public purpose to maintain adequate timber supplies. Would Congress have shown as much interest in forest taxation if the only question involved had been a question of fairness? Probably not. No farm tax study was ever authorized because of any suspected causal relation between methods of farm taxation and a prospective scarcity of farm products. Relative abundance of farm products despite methods of farm taxation has been the problem confronting the farmers. It is for this reason that their demand for

[1] This paper was read at the Twenty-third Annual Meeting of the American Farm Economic Association, Cincinnati, Ohio, December 29, 1932.
[2] Senate Report Number 28, 68th Congress, 1st Session, p. 1.
[3] U. S. Statutes, Volume 43, p. 653.

tax reform and the impetus for farm tax research has arisen mainly from conceptions of justice and fairness. If a forest tax study should find, similarly, that taxation has not adversely affected out timber supply, and is not likely to affect materially the future supply, it might still find gross injustice in the taxation of forest property.

But whether the purpose of forest tax research is to determine on the one hand the influence of taxation on forest growth, or on the other hand, the fairness with which forest property is taxed, farmers of the forest regions are peculiarly interested. Their interest transcends that of public spirited citizens concerned with the future timber supply of the nation; it concerns the amount of taxes the farmers themselves pay. Forest property is an important part of the tax base of their local governments. This is particularly true where merchantable timber and valuable young growth are found. And, through tax delinquency, much of the tax base of cutover counties has disappeared in recent years. Farmers of the cutover regions would like to know to what extent they, through their own local assessors, have discouraged private forestry, reduced the tax base of their own local governments, and hence tended to increase their own taxes. In fact, they are so much interested in this question that any research which will answer it might quite properly be called farm tax research.

Less than fifteen years ago many public and private agencies in various parts of the United States were doing everything possible to pull out the stumps and put the cutover land under the plow. Thousands of farmers now in the cutover regions were encouraged by such agencies to make farms out of this land. Much of the cutover land was then widely regarded as potential farm land. Today it is practically all called "forest" land, if anything. It has become forest land merely because the prospect for agricultural use has disappeared. Agitation for forest tax reform has been especially strong since the post-war collapse of farm prices.

Because of its supposed value for agricultural use, much of the cutover land has undoubtedly been taxed distinctly higher than would have been the case had it been valued for growing trees instead of farm produce. As a consequence, many people who are either forestry-minded or profess to be so, and who own some of this land, have suggested that if property taxes were lowered or abolished altogether they would be able to prac-

tice forestry. Otherwise, they have said, they would be compelled to allow the land to revert to public ownership through tax delinquency.

The farmer's interest in the taxation of cutover forest lands is perhaps fairly well illustrated in the case of the 1,300 farmers of Washburn County, Wisconsin. This is a rural county and is probably sufficiently typical of the Lake States cutover region to serve as an example. Of the total area of the county, 61 per cent is cutover forest land, 19 per cent is suitable neither for forests nor farms, 13 per cent is in cultivated fields and cleared pastures, and the remaining 7 per cent is in lakes and roads. Almost a third of the total land area is in farms, and more than half of the land in farms is cutover forest land. In August, 1931, the county held one or more tax certificates against 36.6 per cent of its land area, most of which was forest land. It had already taken tax title to 7.7 per cent of its area and could now take title to an additional 15 per cent.[4]

Farm incomes in this region are exceptionally low; and despite the fact that a considerable portion of the cost of local government is defrayed by state aids, farm taxes are extremely burdensome. The average real estate tax per acre on Washburn County farms in 1929 was 52 cents, which represented 1.24 per cent of the estimated average value per acre. The comparable tax per acre for the United States as a whole was 58 cents, which was 1.19 per cent of the estimated value per acre.[5]

The first fact of significance in relation to the farm taxes of Washburn County is that the county and its subordinate taxing districts now receive no tax revenue from more than a third of the land area. It is apparent that this land, under present economic conditions and under present tax levies, has no market value and that it has been over-assessed. Tax delinquency is conclusive evidence on these points. Elaborate studies for the purpose of determining whether the land is over-assessed would be a waste of funds, but studies which will show how much it is over-assessed would answer the practical and important question that has been bedeviling the farmers for nearly a decade.

They would like to know what value, if any, this land would have if assessments were lowered. Much of the same kind of land which the farmers bought for ten and twenty dollars per acre now goes tax delinquent when assessed at half these figures.

[4] See Wisconsin Extension Service special circular entitled, "Making The Most of Washburn County Land."

[5] Based on data from the 1930 Agricultural Census.

A scientific valuation of all property in a forest county may have a bearing on the future timber supply. It certainly has a bearing on farm taxes.

Washburn County farmers' actions with respect to the cutover land would seem to indicate that they think its value under reduced taxation would be so low that the feasible tax revenue would not greatly exceed the cost of tax administration; and that, therefore, they would gain little in the immediate future by so reducing assessed valuations that continuous private ownership would be assured. As to the more distant future, they seem to have concluded that the importance of this kind of property in the tax base, assuming that it is taxed under the general property tax and that it does not become valuable for a higher use than forestry, would not be very likely to increase unless adequate public fire protection were afforded. Are these farmers right or wrong? To what extent might they increase the taxable wealth of their community by adjustments in taxation? Is the problem confronting them a forest tax problem? If so, what measures are appropriate for dealing with it?

Tax research should endeavor, among other things, to determine whether and to what extent the tax delinquency problem of the cutover regions really is a forest tax problem; not simply assume that it is, because the land will grow trees and seems to be useful for little else. The answer to this question requires a scientific valuation of the property for tax purposes. So-called selling value has utterly failed to serve as a reasonable basis for the taxation of many kinds of property. In the absence of selling values, reasonable estimates of value are needed,—not only for forest property, but also for farms and other property.

A scientific appraisal of cutover land would undoubtedly reveal that much of it has no higher value than its value for forestry. Forest valuation experts might give the public the best possible appraisal of such land for private forestry purposes. It is realized that there are many uncertainties in forestry that are entirely unrelated to taxation. For example, will the state pay all fire protection costs? What reasonable grounds are there for estimating the price of forest products 50 years hence? Despite these uncertainties, it might be helpful to focus expert opinion upon the problem. Valuations might be made under various assumptions.

Under various kinds of management, assuming insect and fire control, the probable output of timber can perhaps be estimated

with a reasonable degree of accuracy. Assuming various prices for this output, and assuming further that the state will pay all fire protection costs, what might be the value of the land under various rates and methods of taxation? If it should be found that under the most favorable conditions the present value of the land for private forestry purposes is insignificant, it is fairly certain that its value based on the vague hope that it may be useful for something sometime would be just as great. Thus, what might have been regarded as wholly a forest tax problem would be quite as much a "speculative" tax problem. In this case, public policy regarding it might well differ from what it would be otherwise.

If the value for private forestry under virtually tax free conditions is practically nothing, there must be good reasons for believing that private forestry would result in greater output than public forestry before there is any occasion for raising the question as to whether or not the general property tax is particularly ill-adapted to the reforesting industry,—as is generally supposed. If fire protection is a major cost and the public is destined to bear the bulk of it, if forest growth would not be greater under private ownership, and if local governments are to get only such annual revenue from the land as public fire protection makes possible, the evidence would seem to point strongly toward public ownership of forest land and no forest tax problem.

Scientific valuation of any kind of forest property for tax purposes might properly be called forest tax research. Such valuation of cutover, tax-delinquent land should help determine what land is valuable only for public forestry. To the farmers of Washburn County, these valuations might be of particular significance at this time. As a result of the operation of the Wisconsin Forest Crop Law since 1927, it has been found that for the most part private owners see so little value in the land for forestry that they are unwilling to pay an annual tax of ten cents per acre. Would they pay an annual tax of five cents per acre? Or, would they be willing to pay ten cents, if they were not required to use the land in a manner prescribed by the State Conservation Commission?

A major part of the problem of forest taxation from the point of view of all interests concerned, including the farmer, is a problem of valuation. Farmers in the more valuable forest areas would like to know whether any part of their taxes is due to an under-assessment of forest property. But beyond the problem

of valuation there is the question of whether or not there is something unique about forest values (excepting the values of sustained-yield forests) that requires special tax treatment. Perhaps the special forest tax laws are merely evidence of a widespread belief that reasonably accurate forest values cannot be determined. If so, this reason for their existence should be clearly understood. It is virtually certain, however, that they are based quite as much upon the idea that forest properties would be unfairly and unduly taxed under the general property tax even if the tax were levied on an absolutely accurate value.

The writings of some of the forest tax authorities have long emphasized the mathematical certainty that an annual property tax upon any property, the income from which is long deferred, will absorb a larger proportion of the income than a similar tax upon a property the income from which is realized annually. The income from young, single age-class forests is long deferred. Because of these facts the forest tax experts seem to conclude that the tax "burden" on the owners of such properties is generally unfair and excessive. Obviously, anyone who invests his income or savings in wealth subject to the general property tax, will pay more taxes than one who never saves or who so invests his savings as to escape the tax. This is true, whether the saving is voluntary or compulsory. That such taxes are necessarily unfair is quite another question. At any rate, agricultural economists will note the fact that farmers of the cutover regions are subject to a similar tax burden and for the same reason.

Most of the farmers in these regions, over a period ranging from 10 to 50 years, have literally "carved" their farms out of a wilderness, and are still "carving." Their farms are their only "incomes" from property and a part of their incomes from labor. They started their operations with strong backs and little else. They used their "wages" for subsistence, and what "income" they got from their property they "reinvested" in the farm, along with a part of their wages. Every building constructed, every fence built, every stump pulled, and every rock removed was a reinvestment of income which has been "long deferred." A lifetime of saving has accrued to build up the present value of the farms, and the saving from the first year has been taxed every year thereafter under the general property tax. Now it may be argued that the farmers of these regions might have done otherwise with their income, whereas the forest owner has no choice once he has embarked in the reforesting business. He must auto-

matically reinvest his annual "income" with the original capital. But the farmers could not make farms and exercise their so-called "choice" at the same time.

In support of the forest owner's case for special tax treatment, it may be contended that once farms have been made there is no necessity for remaking them, as is the case with forests. But why should forest owners be allowed to strip the land again? And even if they should do so, an annual tax levied on reasonable valuations would amount to no more, in relation either to the income or original capital of the forest owner, than has the same kind of tax on thousands of farms. In most communities there are farmers who have reinvested over a period of years as much or more than their property incomes. They have invested in more land and buildings because they knew more about land and buildings than anything else.

It does not follow, moreover, that merely because a tax on one kind of property absorbs a larger proportion of the income or value than the same kind of tax on another kind of property, it is therefore more of a burden, and unfair. To say nothing of other possible qualifications, tax capitalization must be taken into account. Should Washburn County lands be offered for sale under two different systems of taxation, the sale under the system which provided the lighter tax would very likely bring the larger prices. To the extent that purchasers anticipated the tax in the prices paid, the ratios between taxes and income under the two systems would not measure the burden.

In conclusion, it is well to repeat that the farmer is intensely interested in forest tax research as it affects farm taxes, but only mildly interested in its relation to the future timber supply. The effects of such research upon farm taxes may result from efforts to deal with either or both of two distinct problems; (1) The problem of valuing forest properties, and (2) the problem of determining appropriate measures for taxing forest values.

If it can be shown that the tax is actually the "limiting factor" in forcing excessive and early cutting of merchantable timber, and that the growth of trees on cutover land is actually less than it would have been under a different tax system,—then forest taxation is affecting both farm taxes and the future timber supply. Otherwise, the issue between forest and farm taxes is merely one of equity.

NOTES

PRESENT TRENDS OF LAMB FEEDING IN NORTHERN COLORADO

The winter feeding of lambs in the Greeley and Fort Collins area of Colorado has developed into an industry involving the feeding of more than a million lambs. The average number on feed in Colorado for the period 1927 to 1931 inclusive, averaged 55 per cent of the total inspected slaughter of lambs at seven of the largest markets, from January to April inclusive.[1] Approximately 73 per cent of the number fed in Colorado are fed in Northern Colorado. Assuming the eight-year average cost per head from 1922 to 1929 as representative, the amount of money involved in purchase cost and freight charges would approximate eight million dollars. In addition, 56 per cent of the feed cost per head of $3.10 represents cash feeds purchased.[2] These feeds are corn, protein supplements and some local grown alfalfa. The finances for the cost of lambs, freight and cash feeds are, for the most part, secured through local financial institutions, Denver banks and commission firms. Any factors affecting these sources of credit are reflected in the numbers of lambs on feed in Northern Colorado.

For 40 years these courses of credit have functioned exceedingly well, making possible the feeding enterprise, which it has been estimated increased the net farm income between 1922 and 1928 by some $1,200 a year.

Some years, as in the spring of 1927 and again in the spring of 1930, losses were encountered. These losses, resulting in accumulation of debt by the feeder, restricted credit to such an extent that the number of lambs purchased declined approximately 52 per cent in the fall of 1927 and 37 per cent in the fall of 1930 relative to the preceding years. It is true that feed supplies, especially alfalfa roughage, have been a factor in reducing the number of lambs fed. The partial use of corn fodder, cane or sorghums and protein supplements for alfalfa, in recent years has removed the importance of alfalfa as affecting the number fed.

The losses of $4 or $5 a head in the feeding season of 1929-30, together with the failure to regain these losses in the 1930-31 season and the continued general decline in business threatened until late in the fall of 1931 to restrict credit completely. Banks were unwilling to consider lamb feeding loans until the potato and beet harvest was well under way and the danger of loss by freeze, as in the fall of 1929, was eliminated.

Experienced sheep feeders, who had been in the habit of contracting lambs as early as April, began to wonder about a market for their home-raised barley and alfalfa. Bankers who held crop mortgages against these crops wondered about loan payments. Everyone seemed to be playing a game of waiting for some hidden force that would ring the bell of prosperity or sound the gong of doom.

One Colorado banker, acquainted with range production and the winter feeding of lambs, became convinced that, if banks or credit institutions

[1] Colorado Station Bulletin 394, p. 6.
[2] Colorado Station Bulletin 394, p. 44.

could no longer finance the industry, more intimate cooperation between grower and feeder would be necessary. To a group of feeders and growers he made two proposals. First, the grower, having lambs but no funds to finance feeding, would ship such lambs to the feeder who had feed but insufficient credit to purchase lambs. Second, the grower, who had the lambs and credit for feeding, could take advantage of the experience of sheep feeders and their equipment by paying them five cents a head a month for the feeding of these lambs, and in addition, purchasing what feeds the feeder might have.

The terms of agreement under the first proposal were that the lambs were to be charged against the feeding operations at 50 cents a hundredweight above market price. The feed was charged at market price. The returns above these costs plus freight and interest on money necessary for additional feed were to be divided equally between the grower and feeder.

The local bank agreed to advance one dollar a head to the range bank for release of the lambs since most of the lambs were mortgaged. In addition, freight and feed costs, the latter not to exceed $1.50 a head, were advanced by the local bank, the bank holding a first mortgage against the lambs. Nine thousand, nine hundred and thirteen lambs were fed under the partnership contract and 18,256 under a labor contract agreement during the season 1931-32.

The results under this contract were gratifying, mainly due to a rising market through March and to the middle of April. Partnership feeders secured a return of 38 cents a head for their labor and use of equipment. This may be compared with a return of approximately 22 cents for the feeder who fed under the labor contract plan.

The grower under the partnership plan received $4.45 a hundredweight based on range weights, or approximately 95 cents above the range price the previous fall. The grower under the labor contract received $4.56 a hundredweight based on range weights. The growers who sold outright to individual feeders, 19 feeders in number, involving 34,745 head, averaged $4.13 a hundredweight range weight.

Many individuals feel that only where the master's eye supervises his own investment can efficient gains and cheap production costs be secured. The facts are as follows: The partnership and individual feeders secured a hundredweight of gain at a feed cost of $5.85. This was 43 cents a hundredweight below the labor contract group. Faster daily gains were secured by the partnership group of feeders as well as a greater total gain per head. This was secured in spite of a greater percentage death loss for this group of feeders than for the individual feeders or for that group of feeders under the labor contract plan.

Appraising the lambs under the labor-contract feeding plan at $4 per hundredweight range basis; the partnership group at $3.90 per hundredweight; and the individual feeder group at an average cost of $4.13 per hundredweight; charging feeds at market price; labor at five cents a head a month, and interest on purchase cost plus freight, the net returns per head were 48 cents for partnership, 30 cents per head for grower under labor-contract and 22 cents per head for the individual feeder.

The advantages that can be secured through a partnership feeding ar-

rangement are: (1) Elimination of speculators' profits. (2) A sharing of expenses and income by grower and feeder, thus dividing the risk of loss. Profits are also divided. (3) A means whereby the grower may find an outlet for his lambs under price conditions that are above feeder lamb prices in the fall. In this connection it is well to note that the trend of fat lamb prices moves upward during the season of marketing fat lambs from Colorado even though the supply of lambs moving to market from Colorado is increasing. During the fall months the price trend is downward as the supply increases. (4) The feeder is able to find a market for his home-raised feeds which would be considerably above the returns were he forced to ship his hay and grain outside the local area. (5) The feeder is able to secure barnyard manure for fertilizer which is necessary in an intensive sugar beet and potato-growing area. (6) The feeder is able to retain more competent help since year around work can be secured.

Some 72,000 lambs are being fed under the labor contract plan during the present season. It is estimated that 78 men will find winter employment this season in feeding and caring for these lambs. The average monthly income for labor and hauling by Colorado feeders under this labor contract is estimated to be about $120 a month for 4½ months. In addition, approximately 6,390 tons of alfalfa will be consumed, valued at $51,120.

Wyoming sheep producers in 1932 were successful in securing financial aid through the Reconstruction Finance Corporation to undertake this enterprise themselves since local financial institutions were disinclined to lend funds to independent feeders.

Many people feel that in the future some financial agency, other than local banks, may have to furnish the credit for the lamb feeding enterprise. It is felt that local banks, being a depository for savings, have no right to loan these funds for a somewhat speculative enterprise, since a loss may only be repaid over a period of several years. Severe losses tend to freeze the assets of a bank, restricting the opportunity, by restricting credit, for a feeder in succeeding years to repay the loss. The confidence of the depositor of the bank may be shaken and cause local financial difficulties especially in years of depression. This feeling is held by some bankers. They, as well as others, feel that some large governmental financial institution should undertake the financing of semi-liquid loans. These institutions could replace range banks as credit institutions holding range sheep production loans and upon sale or shipment of lambs to feedlot the loan could be transferred from the sheep producer to the feeder. Some such organization may eventually be worked out if close cooperation of the activities of the federal financial institutions is secured in the future.

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DISSEMINATING OUTLOOK INFORMATION IN INDIANA

Because of the importance of timeliness in connection with outlook information, a concerted effort has been made in Indiana to disseminate outlook information as soon as possible after the national outlook confer-

ence held during January. To permit the printing of the state outlook bulletin as soon as possible after the annual conference, the manuscript was written up in preliminary form and submitted to all interested commodity departments before the state representative attended the national conference. Immediately upon his return the necessary corrections and changes were made and the manuscript was ready for printing. This procedure made it possible to have the bulletin ready for distribution within a week after the national conference was held and permitted holding district outlook conferences in the state during the second week after the national meeting.

During the past few years a special effort has been made to assist county agricultural agents and local leaders in their efforts to understand and utilize outlook information better. With this in mind, for several years, a series of district outlook conferences have been held in the state during the month of February to which are invited from five to seven county agents along with their local leaders. Since these conferences take the form of a training school wherein the county agent leader, the extension economist, and the county agents all play a definite part, they are not thrown open to the public and the attendance is generally composed of a group of from 15 to 40 in number. The forenoons of these conferences are given over to a discussion of the economic situation, both at home and abroad, along with the presentation of a film strip prepared for the use of the county agents and their leaders. The afternoons are taken up by the various agents, each giving the outlook on one or two major Indiana commodities to which he has been previously assigned. The county agent leader acts as chairman of the meeting, assists in raising questions to be discussed, makes a summary statement at the close of the meeting, and provides the agents with outlook news articles for use in their local papers.

The economic film strip idea was first tried in 1932 and was continued this year. Prior to that time a series of wall charts was prepared and circulated among the county agents for use in local meetings. The principal objections to the charts were that in some instances other charts were desired, and many of the agents had the feeling that they could not effectively use the charts provided because of lack of information and training. Consequently a syllabus containing a discussion of each frame composing the film strip was made up and distributed with the strip. These brief discussions greatly assisted the agents and their leaders in presenting the material to local groups, and helped to encourage holding a greater number of outlook meetings throughout the state.

Results obtained from the foregoing method of disseminating outlook material in 1932 can best be given by the following summary:

	Number
Counties in which definite use was made of outlook information	84
Counties in which film strip was used	68
Counties in which local leaders were used	36
News articles published in local papers	516
Total meetings held	682
Total attendance	64,705

During the past year more extensive use has been made of the radio in connection with the outlook program. Prior to the district conferences a preliminary broadcast was made which had to do with the preparation

and accuracy of outlook information, its value to Indiana farmers, the means of obtaining the information contained in the 1933 report, and announced future broadcasts on the subject. During the time that the district conferences were being held throughout the state, four other broadcasts were given, three of which were syncronized with organized county meetings. These broadcasts were discussions of the first ten frames of the film strip that had been prepared, and had to do with the economic situation, price trends, and farm incomes. As the discussion proceeded over the radio, the county agents projected the charts on a screen so that the audience could follow the discussion by both eye and ear. At the termination of the broadcasts the county agents in the various meetings continued the discussion by presenting the remainder of the film strip which pertained to livestock and livestock products, and important grain, feed and truck crops for Indiana. Present reports show that more than 1,400 people were in attendance at the twenty-five meetings held for the purpose of receiving these broadcasts. Considerable publicity was given to these meetings through both the daily papers and farm periodicals. The *Indiana Farmers' Guide* carried a feature article displaying the charts discussed over the radio and it is thought that many farmers did not attend the organized meeting in their counties, but listened to the broadcasts and followed the charts in the *Guide*.

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ECONOMIC ADJUSTMENT MEETINGS IN ILLINOIS

The College of Agriculture and Extension Service at the University of Illinois have conducted two series of economic conferences during the current year which covered the entire state. This continues a practice which has now been followed for several years.

This year's first series of meetings, known as the Agricultural Adjustment Conferences, was held early in October, 1932 and had as the general theme, "Financing the Farm and Home." Ten conferences were held and 949 people registered as being present. R. R. Hudelson, L. J. Norton, R. C. Ross, of the Department of Agricultural Economics, Miss Paulena Nickell, of the Department of Home Economics, and F. E. Longmire and J. D. Bilsborrow, of the Extension Service represented the College at these meetings. This topic proved to be of general interest, and there was a great deal of discussion at all of the meetings.

Following the practice of the last two years, a mimeographed book containing the talks and various background materials was prepared. Follow-up meetings were held by representatives of the College in about 50 counties.

The second series, known as Outlook Meetings, was held early in February, following the National Outlook Conference. In all, 30 meetings were held, which were attended by representative farmers from all counties in the state. Eighteen men, representing various departments of the College, participated in these meetings, which were all held in a single week. In spite of the fact that the week in which the conferences were held was marked by some of the severest weather in recent years, about 1,600 people registered as attending these meetings. Based on the attend-

ance for the first day, when the weather was still favorable, this attendance would have been much larger if the weather had remained favorable. The annual Agricultural Outlook for Illinois for 1933 was prepared by a College committee prior to these meetings. The interest of those in attendance was keen, particularly in connection with the outlook for the general economic situation and its relation to the agricultural outlook. In a number of counties the farm advisers in connection with local farmers are leading discussions concerning this material at local meetings.

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FARM INDEX RATIOS IN DEBT SETTLEMENT

Paying off farm mortgages has for years been a problem for North Dakota farmers as well as for farmers in other states and the farm economic situation in late years has made the problem increasingly difficult. This situation has brought out various schemes for purchasing and paying for farm lands. Instances are known wherein the purchase price is designated as a certain quantity of wheat or potatoes delivered each year. One objection to this plan is that no one knows whether wheat or potatoes or some other line of production will be profitable or desirable lines of production 10 to 20 or 30 years hence.

A much simpler plan would be to use the ratio between the price of products raised by farmers and the price of non-agricultural products. This would avoid the necessity of sticking to any specific line of production that in the future may become extremely unprofitable. The index ratio plan can be adapted to existing mortgages, new purchases, interest rates and even to land values.

When the ratio is above 100 it is favorable to the farmer but when it is below 100 it is unfavorable and as it goes lower it becomes more and more difficult to meet obligations. With this thought in mind it is suggested that the interests of both the buyer and the seller would be safeguarded and their risk equalized if the purchase price of land, the yearly payments on principal and interest payments were based on the ratio of prices.

In this discussion the ratio used is the ratio of prices received by farmers in North Dakota and prices paid by farmers in the United States expressed as an index with the period 1910-1914 as a base. Different communities or states may find it advisable to use index figures on more specific lines of production or those particularly adapted to their locality.

To explain the operation of the plan an actual farm in eastern North Dakota has been taken as an example. This farm was purchased January 1, 1918, at $30.00 an acre, or $9,600.00, with interest at 6.8 per cent a year. Only a small amount has been paid on the principal and the unpaid interest had increased the debt to $11,050.00 by the end of 1932.

For purposes of discussion it is assumed that the $9,600.00 mortgage was to be paid in 20 annual payments of $480.00 each, with interest at 6.8 per cent a year. In 1918 the average index ratio was 126. The 1918 payment would then have been $480.00 plus interest at 6.8 per cent or $652.80 because the 1918 value is considered as 100. This payment would have been fair to both parties as it was close to the time when the agree-

ment was entered into. Future payments of both principal and interest would be based upon the index ratio. When the ratio is lower than in 1918 the payments would be less and vice versa.

Amounts of second and following payments on principal would be determined by dividing $480.00 by 126 and multiplying by the ration for the year payment was being made. That is, if a farm index ratio of 126 is equal to $480.00, one point is equal to $3.81. The principal, however, would be reduced each year by $480.00. The annual interest payment would be calculated by first adjusting the balance of the principal to the ratio index for the year payment was being made, as described above, then calculating the interest on this principal at 6.8 per cent. The following table shows the results of the operation of the plan since 1918, compared with the ordinary method in common practice.

Under the ordinary method fifteen annual payments on the principal would have amounted to a total of $7,200.00 and interest would have been $6,364.80. If the ratio of prices had remained or averaged the same during the period, as it was in 1918, the seller would have been justified in demanding these payments. Events beyond the control of either buyer or seller, however, changed the price situation so that on the average for the fifteen years the same products grown on the farm would have warranted payment of only $4,837.21 on the principal and $4,577.87 in interest. This would be the amount called for under the index ratio method. If the index ratio had gone higher instead of lower the total payments would have been greater, the difference representing the increase in net productive value of the farm during the period.

INDEX RATIOS AND PAYMENTS ON PRINCIPAL AND INTEREST BASED ON INDEX RATIOS AND ORDINARY 20 YEAR METHOD, 1918–1932
(Base period, 1910–1914 = 100)

Year	Index Ratio	Amount of principal	Payments required by index ratio method		Payments required by ordinary method	
			principal	interest[1]	principal	interest[2]
		Dollars	Dollars	Dollars	Dollars	Dollars
1918	126	9,600	480.00	652.80	480	652.80
1919	116	9,120	441.90	570.94	480	620.16
1920	115	8,640	438.12	536.23	480	587.52
1921	79	8,160	300.95	347.90	480	554.88
1922	76	7,680	289.52	315.00	480	522.24
1923	71	7,200	270.47	275.89	480	489.60
1924	80	6,720	304.76	290.13	480	456.96
1925	96	6,240	365.71	323.29	480	424.32
1926	96	5,760	365.71	298.42	480	391.68
1927	89	5,280	339.05	253.51	480	359.04
1928	83	4,800	306.21	215.01	480	326.40
1929	83	4,320	306.21	193.50	480	293.76
1930	68	3,840	259.06	140.92	480	261.12
1931	52	3,360	198.10	94.29	480	228.48
1932	45	2,880	171.44	69.94	480	195.84
Total			4,837.21	4,577.87	7,200	6,364.80
Balance		2,400			2,400	

[1] Rate of interest is 6.8 per cent per annum and adjusted by index ratio.
[2] Rate of interest is 6.8 per cent per annum.

Payments of principal and interest on mortgages now in effect might well be adjusted and governed by the ratio method and as the purchasing power of farm products returns toward normalcy the amount of the payments will automatically increase.

The ratio method can be used also to adjust land values to current productivity values when land is purchased on the future payment plan. It is known that from the production standpoint, farm lands are not worth as much as they were in 1918. If the 1918 valuation of the farm being discussed was fair to both parties at that time it would be only fair to reduce the valuation in 1932 to conform to the index ratio which represents the power of the farm to pay. Assuming that $9,600.00 was a reasonable valuation for the farm in 1918 the 1932 value would be 1/126 (126 is the ratio in 1918) of $9,600.00 multiplied by 45 (45 is the ratio in 1932) or $3,428.55. Future payments would be adjusted according to changes in the ratio. The index ratio plan would not be applicable to the determination of present cash value of land except perhaps as it would indicate minimum values at current prices.

The amount of the down payment, the interest rate and the term of years over which payments are to be made would be agreed upon by the parties concerned. These factors would naturally be satisfactory to both parties at the time the contract was made and any unforeseen changes in the purchasing power of the farm then would not penalize either party.

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RELATIONSHIPS AMONG OKLAHOMA FARM PRICES

Over long periods of time the prices of farm products show strikingly constant relationships to one another. This is true except when important changes in the relative costs of production or changes in the demand for certain products take place. During short periods of time, a year or more, certain prices may get far out of line with the usual relationship. For example, when there is a large wheat crop and a small corn crop locally, wheat prices may fall to the level of corn prices, or a widespread strengthening of the demand for cotton may raise the price of cotton relative to hog prices. However, after a sufficient period has elapsed to allow farmers to shift their production about in the light of the new demand or cost of production condition, a definite relationship of the price of one farm product to another is reestablished. In other words, if the price of one farm product becomes such that the production of that commodity is more profitable than alternative uses of land and labor, production is stimulated, the supply of that product increases, and the price is driven back to the usual relationship with competing farm enterprises. Conversely, a price so low as to make the production of any farm product less attractive than other enterprises discourages production of that product and ultimately the price is brought back to the usual relationship.

In a drastic decline in commodity prices such as we have experienced the past three years, the usual relationship of prices is disrupted in a striking manner. The adjustment of costs comes slower in some lines of agricultural production than others, primarily because more of the costs of some products are out of the control of the individual farmer than is the case with other farm enterprises. Also changes in consumer purchasing power or demand do not affect the prices of all farm products simul-

TABLE 1.—NORMAL PRICE RELATIONSHIPS OF OKLAHOMA FARM PRODUCTS

Product	Wheat (bu.)	Corn (bu.)	Cotton (lb.)	Cattle (lb.)	Hogs (lb.)	Butterfat (lb.)	Chickens (lb.)	Eggs (doz.)
	Price Equivalent[1]							
1 bu. wheat	1	1⅓	6	18	12	3	6	5
1 bu. corn	¾	1	4½	12½	8½	2¼	4½	3¾
1 lb. cotton	1/6	¼	1	3	2	¾	1	¾
1 lb. cattle	1/18	1/12	⅓	1	⅔	1/6	⅓	⅓
1 lb. hogs	1/12	⅓	½	1½	1	¼	½	½
1 lb. butterfat	⅓	⅓	2	6	4	1	2	1½
1 lb. chicken	1/6	¼	1	3	2	½	1	¾
1 doz. eggs	¼	¼	1½	4	2⅔	¾	1½	1

[1] The price equivalents indicate the normal relationship between the price of one commodity and the others. Thus the price of a bushel of wheat is normally six times the price of a pound of cotton or three pounds of butterfat.

taneously and to the same extent. The retail price of butter is quickly and rather accurately reflected in the farm price of butterfat, while changes in the prices of shoes and shirts are not usually closely associated with changes in the prices of steer hides and cotton. Farm products requiring much processing or where transportation or handling charges are a large proportion of the retail price show little relationship between the cost of the raw material and retail price of the finished product.

The normal price equivalent or ratios of the prices of Oklahoma farm products to each other are shown in Table 1. Thus the price of a bushel of wheat is normally six times the price of a pound of cotton, three times the price of a pound of butterfat or five times the price of a dozen eggs. Likewise corn in Oklahoma is normally three-fourths the price of wheat and hog prices are usually a half higher than the average price of all grades of cattle.

TABLE 2.—AVERAGE PRICES OF OKLAHOMA FARM PRODUCTS AND RATIOS TO BUTTERFAT PRICES

Period	Number years	Wheat (bu.)	Corn (bu.)	Cotton (lb.)	Cattle (lb.)	Hogs (lb.)	Butterfat (lb.)	Chickens (lb.)	Eggs (doz.)
Average Prices									
1910–14	5	$ .82	$.63	$.11	4.8¢	7.1¢	$.23	$.09	$.16
1910–32	23	1.13	.78	.16	5.8¢	8.7¢	.32	.14	.21
1922–29	8	1.09	.78	.20	5.8¢	8.6¢	.36	.17	.22
1932	1	.30	.22	.06	3.4¢	3.2¢	.14	.08	.10
Ratios to butterfat prices									
1910–14	5	3.6	2.8	.48	.21	.31	1	.46	.71
1910–32	23	3.5	2.5	.51	.18	.27	1	.46	.66
1922–29	8	3.0	2.2	.54	.16	.24	1	.47	.61
1932	1	2.1	1.6	.40	.24	.23	1	.58	.71

[1] On the average during the eight-year period, 1922–29, a bushel of wheat sold for as much as three pounds of butterfat, while in 1932 a bushel of wheat sold for only 2.1 times as much as a pound of butterfat. When a pound of cotton will buy more than half a pound of butter in Oklahoma, cotton production increases.

Wheat, corn, cotton, and hog prices are low at the present time in comparison with the prices of eggs, butterfat, beef cattle, and chickens. There is no reason to expect that this deviation from the usual relationship will last for any long period of time or at least persist long after a return to more normal demand conditions. The relationship shown in Table

2 for the year 1932 has existed to a considerable degree since the drastic decline in farm prices started three years ago. In response to an unfavorable price relationship the acreage of cotton in Oklahoma has declined by one-third during the past four years, and the wheat acreage by more than 15 per cent while the production of butterfat has increased sharply. Oklahoma produced 11 per cent more creamery butter in 1932 than in 1931 not because butterfat production was particularly profitable but because 14 cent butterfat is more profitable than six cent cotton and 30 cent wheat. The increasing number of dairy cows in the state and the country over indicates that the dairy industry faces serious overproduction. Eventually the prices of dairy products will come into the usual price relationship with alternative uses of farm land and labor even though all prices remain on the present low level.

This discussion might be summarized as follows: With a given price level and rate of consumption, the prices of farm products are determined by the costs of production. Average prices are an accurate expression of the average costs of production. Relative prices show relative costs. All of these statements are true only for long periods of time. In a given year the prices of various farm products may be considerably above or below their respective costs of production.

Whether the average of all farm prices is high or low is determined largely by the amount of money consumers have to spend for food and clothes. Whether cotton stays at five cents a pound and wheat 30 cents a bushel or goes back to a level of five years ago is dependent upon the income of consumers which in turn is dependent upon the amount of money and bank credit available in this country relative to the amount of business done. Yet whether cotton stays at five cents per pound or goes up to ten or 15, wheat will, over long periods, sell for about six times as many cents per bushel as cotton does per pound in Oklahoma unless radical shifts take place in their respective costs of production. This information should be valuable in planning the long-time organization of individual farm businesses.

The above discussion is not adequate in its explanation of the effect of deflation upon the lack of parity of farm and retail prices or of the present prices of particular products. Some liberties have been taken with economic theory, at least as to the dynamic rather than static nature of the price-making process in order to simplify the statement of principle involved. The long-time trend of various price ratios has been purposely neglected though research along this line might be profitable. Long-time price ratios have much to recommend them over calculated cost of production figures in studying the broad outline of production trends.

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"VERTICAL" AND "HORIZONTAL" SHIFTS OF DEMAND

Several articles in comparatively recent issues of the JOURNAL have contributed to a better understanding of certain theoretical concepts relating to the demand curve.[1] Notes by Waite and Shepherd were particularly concerned with the meaning and measurement of changes in demand.

[1] See issues of Oct., 1930; Oct., 1931; Apr., 1932; July, 1932; Oct., 1932.

Shepherd[2] refers to an article by Waite[3] as having demonstrated that "a vertical shift in the location of the demand curve generally has a different effect upon price from that of an equal horizontal shift," although the Waite article distinguished between vertical and horizontal shifts, if at all, only by implication. Shepherd developed in considerable detail the distinction between vertical and horizontal shifts in demand. The vertical shift in demand is supposed to represent an increase or decrease in the prices which can be obtained for given quantities of a product, while the horizontal shift represents an increase or decrease in the quantity which can be sold at a given price or series of prices.

Actually, there is no difference between these so-called vertical and horizontal shifts in demand. They are merely different points on the extension of the same curve.

It is evident that if the shift in the demand curve is considered with respect to the changes in quantities which will be taken at a fixed range of prices previously encompassed by the vertical scale, the shift *appears* to have been horizontal; whereas, if it is considered with respect to changes in prices which can be obtained for a fixed range of quantities previously encompassed by the horizontal scale it *appears* to have been a vertical shift. However, if the old and new curves were plotted so as to include the complete range of prices and quantities previously encompassed by both scales it would be evident that the so-called vertical shifts in the demand curve also are accompanied by horizontal shifts, and vice versa. Of course, actual transactions within the two periods may not include the full range of prices and quantities, but this does not mean that *willingness* to buy (the generally accepted concept of demand) did not exist outside the range of actual transactions.

The accompanying chart (Figure 1) is a graphic illustration of these distinctions. The line AA′ represents the original demand curve. The so-called horizontal shift in demand is represented by the line CC′, the vertical shift by the line BB'. By plotting the new demand situation in this manner it becomes apparent that the portions of the new demand curve, BC and B′C′, constitute the portion of the new demand situation which represent merely *potential* willingness to buy, and which are not included within the range of actual market transactions, respectively, in the case of the so-called horizontal and vertical shifts.

The question then arises, what causes the alteration of the ranges of actual experience as to price or quantity encountered in the actual market transactions before and after the shift in demand? It should be obvious that this is a matter of supply as well as demand. In other words, whether or not the shift in demand *appears* to have been vertical or horizontal depends upon the supply. In Figure 1, SS represents the original supply, or willingness to produce or sell at a series of prices. If the supply situation remains the same after the shift in demand, i.e., if the curve SS continues to represent supply, the range of prices and quantities covered by the actual transactions during the period included by the second demand situation is represented by that portion of the new demand curve labeled DD′. In other words, there has been a shift in the range of both prices and quantities covered by the market transactions. This range, it

[2] Shepherd, G. S., Supply and Production, Demand and Consumption, *Jour. of Farm Economics*, Oct., 1931, pp. 639-642.

[3] Waite, W. C., On the Term, Change in Demand, *Jour. of Farm Economics*, Oct., 1930, pp. 620-621.

should be noted, is due largely to changes in production resulting from variable yields, and also to temporary alterations in producers' and consumers' reactions to price changes. If it were not for these variable factors, the quantity produced and the price paid would be the same throughout the periods covered, respectively, by the two demand curves, i.e., a quantity of 3.5 and price of 3.5 in the first period, and quantity of 4.5 and price of 4.5 in the second period.

However, when the supply curve also shifts the shift in the range of quantities and prices (not of demand) may be entirely horizontal or

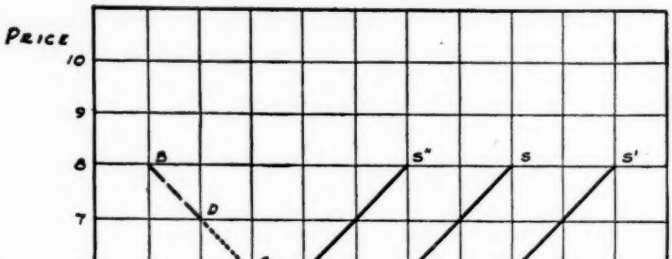

FIGURE 1.—Vertical and horizontal shifts in the demand curve.

vertical. For example, if supply increases the supply curve will shift to the right, now being represented by the line S'S'. This shifts the range of prices and quantities covered by actual market transactions during the period to that represented by the distance CC' on the new demand curve, or horizontally. If, on the other hand, supply is decreased, as in the case of S"S", the shift in the range of quantities and prices is vertical, the new range being represented by the distance on the new demand curve, BB'.

Different elasticities of demand do result in different proportional changes in price and quantity following a shift in the demand curve.[4] If elasticity is less than one, a shift to right or left of the entire curve will result in a larger percentage increase or decrease in the price paid for any quantity than the percentage increase or decrease in the quantity

[4] Waite, W. C., On the Term, Change in Demand, *Journal of Farm Economics*, Oct., 1930, pp. 620-21.

which will be taken at any price. With elasticity greater than unity the percentage changes in price for a given quantity are less than the percentage changes in quantity taken at a given price. Also, of course, changes in elasticity coincident with the shift in demand, i.e., changes in the shape and/or slope of the curve, will result in different percentage changes in prices paid for given quantities and quantities taken at given prices. These refinements of the concept of changing demand, however, do not refer to the erroneously assumed difference between vertical and horizontal shifts of demand, which merely represent a change in the range of quantities or prices encountered within actual market experience.

As an example of the errors of analysis to which the false distinction between vertical and horizontal shifts may lead, the following quotation may be cited: " . . . This calls for analysis of changes in the two factors, population numbers and demand per consumer, which *respectively* (italics added) determine the horizontal and vertical position of the demand curve."[5]

Obviously, an increase in the population would tend to result in *willingness* to use the same quantities at higher prices as well as greater quantities at the same prices. Likewise, an increase in demand per consumer will increase the quantity which can be sold at the same series of prices as well as the prices which can be obtained for the same series of quantities, i.e., will result in both "horizontal" and "vertical" shifts of the demand curve. True, changes in population and in demand per consumer are likely to result in different shifts in the range of prices and quantities actually encountered in market transactions, because of probable coincident shifts in supply, or changes in the *elasticity* of demand.

Ordinarily in discussing price movements it is customary and necessary only to refer to an increase or decrease in demand. However, when describing the movement of the objective representation of demand, the statistical curve, it frequently is desirable or even necessary, particularly in teaching, to describe the movement of the curve itself with reference to the other elements of the chart, namely, the two scales. The term "right" and "left" have been used by the writer to describe shifts of the demand and supply curves. An alternative pair of descriptive terms would be "up" and "down."[6] The question then arises, which of these designations is correct? This cannot be answered properly without reference to two types of regression lines or curves commonly used in calculating the relation between quantity and price, namely, demand and supply-price curves. The distinction between these two types of curves is so infrequently noted that a brief review of their meaning should be given before their relation to the description of shifting demand is discussed. The true demand curve is based on the generally accepted statement of the law of demand: "The quantity taken varies inversely with the price," and as calculated mathematically, price is the independent variable and quantity the dependent variable; or, put in another way, the squares of the horizontal deviations of the observations from the line of estimate (or *demand* curve) are minimized (regression line of x on y).

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[5] Shepherd, G. S., *Journal of Farm Economics*, Oct., 1931, p. 640.

[6] Shepherd, in another article in the *Journal* (issue of October, 1932, p. 659) uses both "up and down" and "right and left," apparently to denote, respectively, the so-called "vertical" and "horizontal" shifts, which it has been shown are identical. The terms as used here apply to shifts of the entire curve, including its extensions beyond the range of actual experience as to prices and quantities.

The supply-price curve is the graphic representation of a different statement of the law of demand sometimes encountered; "The greater the quantity offered for sale the lower the price which can be obtained." In this case quantity is the independent variable and price the dependent variable; or, the vertical deviations of the observed values from the line of estimate (or *supply-price* curve) are minimized (regression line of y on x).[7]

Of course, if the correlation between the two variables, quantity and price, is perfect, all the observed values will fall upon the line of estimate, there is no difference arising from minimizing non-existent horizontal and vertical deviations, and there is no difference between the demand curve and the supply-price curve. While this condition would never be encountered in actual practice, it is evident that where the correlation is so low as to result in great differences between the two regression lines the entire relationship between price and quantity would be invalidated, and either or both curves would be practically valueless.

The distinction between these regression lines is directly related to the description of the movement of the curve. If the y factor is the independent variable, the vertical scale line would properly be the base with reference to which the line or curve representing demand may be said to move. Any shift of such a curve (the "true" demand curve, x on y), therefore, becomes a movement to the right or left.

Conversely, in the case of the supply-price curve (regression line of y on x) the horizontal scale line logically becomes the base, and the shift of the line or curve is a movement "up or down" as contrasted with the "right-left" movement of the "true" demand curve.

From this standpoint it might be correct to refer to a shift of the true demand curve as a "horizontal" movement, and a shift of the supply-price curve as a "vertical" movement, although not as these terms were used by Shepherd. However, since the qualitative distinction between demand and supply-price curves generally is merely a matter of intellectual preciseness, and since any shift of either curve is the result of a shift in demand, the practice of referring to shifts of the curve (or of demand) as being to the right or left appears justifiable.

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DEBT ADJUSTMENT LEGISLATION IN SASKATCHEWAN

Problems associated with farm debt have been bothering prairie legislators and others for many years, and a certain measure of protection from creditors has been extended to farmers under various acts. The demoralizing effects of prolonged deflation superimposed on business cycles, climatic vagaries, and personal misfortunes and shortcomings made it advisable to provide the farmer in distress with some assurance of security of tenure.

Recent interest in debt adjustment legislation commenced with the session of 1928-1929, when a brief act was passed for the purpose of "facilitating the adjustment of agricultural debts." Under the provincial

[7] Holbrook Working (*Quart. Jour. Econ.*, Aug., 1925) suggests the choice of regression lines on the basis of the assumption of errors, or according as the errors of observation apply to either the x or y factor, or both. This, however, should not be confused with the theoretical concept of the relation between the two types of regression lines and the objective, which is a matter of definition.

Minister of Agriculture a Debt Adjustment Bureau was instituted with a Commissioner as the chief officer. This act did not give the Commissioner authority to force a creditor to stop an action, and operations depended entirely on the willingness of the creditor to cooperate.

As about 75 per cent of the revenue of Saskatchewan farmers usually comes from the sales of wheat, the decline in wheat prices has had a disastrous effect on prairie farming. The Saskatchewan wheat crop of 1928 was valued at 247 millions of dollars, which was about equal to the average value of the five crops from 1924 to 1928. Since 1928, the total value of her wheat crops has declined tremendously. The 1929 wheat crop had about two-thirds of the value of that of 1928; the 1930 crop, two-fifths; the small crop of 1931, one-fifth; and the 1932 crop, one quarter. Drastic reductions of revenue from other farm enterprises have also been experienced, and have added further complications to businesses already seriously distressed. To pay interest on the present farm debt of the province would have required about two-thirds of all wheat available for sale from the 1932 crop, and nearly one-third of the wheat crop was required to pay farm taxes.

In the session of the legislature of 1931-32 it was deemed advisable to give more power to the Debt Adjustment Commissioner, and the act of that session contained such provisions as were then considered adequate. On application of the debtor, the creditor was approached by the commissioner and attempts were made to arrange amicable settlements. Where such arrangements could not be made the commissioner might issue a certificate preventing any kind of action being taken against the farmer. After the issue of a certificate the farmer was required to market the main products of the farm under the direction and control of the Debt Adjustment Bureau. Where necessary, bankruptcy proceedings could be undertaken by the commissioner, who was appointed a trustee in bankruptcy for this purpose. Under this act of 1931-32 it was necessary for the debtor to make application to the commissioner for protection. By the end of 1932, some twelve thousand farmers had consulted with the Debt Adjustment Bureau, and for most of these it was unnecessary to issue certificates.

During 1932, the seriousness of the debt burden increased considerably. In most cases returns from farming operations did not cover the minimum cash costs of living and of operating the farm. The small surpluses of earlier times had been exhausted in the stress of previous years, and sources of credit had dried up. Most of the members of the provincial legislature had intimate personal knowledge of the financial problem, and when they assembled adjustment of debts was the principal subject of their discussions. During the summer of 1932 a detailed survey of the farm indebtedness of five municipalities had been made by the Department of Farm Management of the University of Saskatchewan, and the preliminary report to the Saskatchewan Research Foundation was made available for the use of the Legislature.

The activities of the recent session relating to debt adjustment concentrated around two enactments—"An Act to Amend and Consolidate the Debt Adjustment Act"; and "An Act Respecting the Limitations of Certain Civil Rights." The Mechanic's Lien Act also received amendment and an act also was introduced to consolidate tax arrears. Farmers

who had secured loans from the government Farm Loans Board were relieved of one year's payment of interest, and had arrears of interest and principal amortized.

Under the act respecting the limitation of certain civil rights the vendors of farm lands having as collateral either mortgage or agreement of sale may not secure more than one-third of the crop produced on such land in 1932 and 1933, out of which taxes must be paid. Where the vendor or mortgagee contributes seed, twine, or threshing costs the Debt Adjustment Board, on application of an interested party, is required to decide what share of the crop shall be delivered to the vendor or mortgagee, which in no case may exceed one-half of the crop.

The bill as originally introduced, restricted the vendor's or mortgagee's right to recover the land or property concerned. Because of the opposition which developed, the personal covenant feature of earlier bills was retained with slight change. In the case of articles costing more than $100 the vendor's security is limited to the articles in question, but in some cases provision is made for compensation for use, damage, or destruction.

The New Debt Adjustment Act provides for the appointment of a board of three members, of which the Debt Adjustment Commissioner is chairman. Local representatives of the board may also be appointed in each judicial district, who may attend to the general work in connection with applications for consideration. The board may issue a certificate to prevent any action being taken against a farmer. Under this act creditors may not sue on any debt, nor take any action without the permission of the board. The principal exceptions provided permit a municipality to take action for taxes, and allow seizures of goods to be made for rent.

The board has authority to bring about amicable settlements between creditors and debtors. Where this cannot be done the board may suggest terms of settlement. If the farmer will not accept the decision of the board, creditors may receive permission to take proceedings. If the creditor refuses to accept the decisions of the board, a moratorium may be declared for the farmer, or the creditor may be allowed to obtain possession of the asset concerned in complete settlement of the obligation.

Further provisions of the act allow the debtor to apply to the board for debts to be scaled down. Differing interpretations of the powers of the board have been given by legal authorities. Claims have been made that the board lacks the power to adjust debts, whereas the Minister responsible for the introduction of the bill has definitely declared that adjustment powers lie with the board. Recent test cases indicate that some of the provisions of the act may be *ultra vires*, and already some complications are being experienced.

The present Act stays in force until March 1, 1936. It is intended to cover debts originating prior to April 1, 1933. Although intended primarily for farmers the protection of this act has general application.

Legislation in Alberta and Manitoba for debt adjustment is substantially similar to that of Saskatchewan. It is expected that many legal difficulties will be experienced during the year, and that suitable amendments will be introduced when the next provincial legislatures assemble.

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AN INDICATION OF SEASONAL VARIATION IN QUALITY OF EGGS ON TERMINAL MARKETS

The data upon which these notes are based were procured in connection with a study of the factors affecting consumer demand for eggs of various grades in four cities in the twelve-month period November 1929 to October 1930. In this study weekly reports were obtained from a number of retail stores in each city showing the quantities and prices of the various grades of eggs sold. Part of the stores handled four grades of eggs graded according to United States retail grades for eggs in addition to the regular store brands. Eggs of these four United States grades were supplied through chain store warehouses, the eggs being graded at the warehouses. They were delivered to stores by the usual method along with the eggs of the regular store grades. It was assumed that the supervised grading at warehouses would insure eggs of uniform quality being available under each of the four U.S. grades.

To determine whether grading was reasonably accurate and uniform, a few samples of eggs were graded at the retail stores. The records of these store gradings included data as to the number of dozen of each grade or brand graded, the date of grading, the grade of each egg in each dozen, and the number of days the eggs had been in the retail store. These records of store gradings are not available for the entire period of the survey; but the results of such gradings for one city are presented to show that there is apparently considerable seasonal variation in quality of eggs of given grades or brands sold at retail as indicated by usual grading methods, and considerable seasonal variation in quality of all eggs sold. Such variation should be considered in attempting to explain variations in price-quality relationships if the data cover a period of time.

The records of check grading at retail stores gave the number of eggs in each dozen graded as meeting the requirements for U. S. Special, U. S. Extra, U. S. Standard, and U. S. Trade, and the number of eggs checked or broken, having stuck yolks, blood or meat spots, and inedible. For convenience a numerical value or score was assigned to each of these grades or characteristics as follows:

Grade or characteristic	*Score per egg*	*Score per dozen*
Special	10	120
Extra	9	108
Standard	8	96
Trade	7	84
Check or broken	5	60
Stuck yolk, and blood or meat spot	2	24
Inedible	0	0

Thus a dozen eggs which contain nine eggs meeting the grade standards for "Special," and three meeting the standards for "Extra," would be scored 117.

In summarizing the check gradings, quality was found to be influenced directly by the number of days the eggs were held in the stores. After correction for the influence of this factor, a definite seasonal variation in quality was apparent for four of the seven grades, the indices of quality being highest in March or April and lowest in August or September. Eggs of two of the U. S. grades and of one store grade showed little or no seasonal variation. In general, the greatest variation was in the eggs

of relatively low average quality. The results are summarized in the following table.

VARIATION IN EGG QUALITY FOR SEVEN GRADES OF EGGS

Grade or Brand	Dozens graded	Months for which gradings were available	Average quality score	Peak quality month	Low quality month	Quality score in high month as a per cent of quality score in low month
U. S. special	143	9	111.5	—	—	100
U. S. extra	141	9	103.7	—	—	100
U. S. standard	124	9	95.7	March	August	102
U. S. trade	140	9	85.6	March-April	September	104
Private brand A	91	8	102.0	—	—	100
Private brand B	104	8	97.7	March	September	108
Private brand C	92	8	90.7	April	September	112

On the basis of the quantities of each grade sold each month, and the seasonal variation in quality as determined, an index of seasonal variation in quality was calculated for all eggs sold in the stores included in the survey in the one city. The quality indices so calculated are shown by four-week periods as follows:

4-week period ending	Quality index all eggs	4-week period ending	Quality index all eggs
Nov. 23	96.1	June 7	98.4
Dec. 21	96.3	July 5	97.5
Jan. 18	96.9	Aug. 2	95.8
Feb. 15	98.4	Aug. 30	95.0
Mar. 15	98.4	Sept. 27	95.7
April 12	99.5	Oct. 25	95.6
May 10	99.0		

These results indicate considerable variation in the average quality of all eggs sold by these stores during the year, quality being highest in the period March to May, and lowest in the period August to October. Each dozen of eggs sold in the period ending April 12, for example, contained 4.85 eggs that were of one grade higher than was true in the period ending August 30.

It should be noted that no data were available as to whether eggs were shell-treated, storage or fresh, and the like.

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Bureau of Agricultural Economics

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Baird, Frieda and Benner, Claude L., *Ten Years of Federal Intermediate Credits.* Washington: The Brookings Institution. 1933. XVI, 416 pp. $2.75.

Black, J. D., Editor, *Research in Rural Organization—Scope and Method.* New York: The Social Science Research Council. 1933. 160 pp. $.75. (Reviewed in this issue.)

Black, J. D., Editor, *Research in Transportation in Relation to Agriculture—Scope and Method.* New York: The Social Science Research Council. 1933. 94 pp. $.75.

Black, J. D., Editor, *Research in Agricultural Land Tenure—Scope and Method.* New York: The Social Science Research Council. 1933. 89 pp. $.70.

Brunner, Edmund de S. and Kolb, J. H., *Rural Social Trends.* New York: McGraw-Hill. 1933. IX, 386 pp. $4.00. (Reviewed in this issue.)

Campbell, Persia Crawford, *American Agricultural Policy.* London: P. S. King and Sons, Ltd. 1933. 279 pp. 10s 6d.

Clark, Fred E., *Readings in Marketing* (Revised edition). New York: Macmillan. 1933, XX, 798 pp. $3.50.

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Hardy, Charles O., *Credit Policies of the Federal Reserve System.* Washington: The Brookings Institution. 1932. XV, 374 pp. $2.50. (Reviewed in this issue.)

Hopkins, John A., *Keeping and Using Farm Records.* Ann Arbor: Edwards Brothers, Inc. 1932. IX, 203 pp. (Reviewed in this issue.)

Kendrick, M. Slade, *Taxation Issues.* New York: Harper and Brothers. 1933. XII, 147 pp. $1.00. (Reviewed in this issue.)

Morgan, O. S., Editor, *Agricultural Systems of Middle Europe.* New York: Macmillan. 1933. 405 pp. $5.00.

Moulton, Harold G. and Associates, *The American Transportation Problem.* Washington: The Brookings Institution. 1933. LXIX, 915 pp. $3.00.

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Thompson, Warren S. and Whelpton, P. K., *Population Trends in the United States.* New York: McGraw-Hill. 1933. X, 415 pp. $4.00.

Wheat Studies. Food Research Institute, Stanford University.

Vol. IX, No. 6, *Price Relations between July and September Wheat Futures in Chicago since 1885.* 1933. 51 pp. $1.00. (Reviewed in this issue.)

No. 7, *World Wheat Crops, 1885-1932.* 1933. 35 pp. $1.00.

No. 8, *Survey of the Wheat Situation.* 1933. 29 pp. $.50.

BOOK REVIEWS

Agricultural Credit, by Alexander J. Boyazoglu, Rural Economist Laureate of the French Academy of Agriculture. London: P. S. King and Sons. 1932.

This book represents an enormous amount of painstaking work. It is systematic and comprehensive. The setting is distinctively European, and mainly southern European, although many illustrations and some of the logic are drawn from Germany. Virtually nothing from Great Britain or the Scandinavian countries is brought into the discussion. Almost the whole setting of the argument is based on a peasant type of agriculture. The farmer is viewed as a man of small capital, limited outlook and meagre comprehension. The agricultural credit institutions should "exercise a tutelage upon the agriculturist" in contrast with the impersonal manner of loans made to merchants, it being assumed that the merchant knows what he is doing, and will be able to repay. The farmer is to be dealt with firmly, yet leniently.

The author believes that interest rates on agricultural loans should be low, as low as possible. One of his contentions concerning the application of interest rates to farm income will not be accepted by all of our farm accountants. He says that interest may be higher on loans used in current operations—"ameliorations"—than on funds put into permanent investment, because the rate of return is higher in the former than in the latter case. One may wonder whether the rate of return per dollar invested may not be higher in connection with harvest than with seeding. The author says: "In this connection"—i.e., in connection with real estate loans—"there is, usually, no increase of income proper from the farming property arising out of the capital loaned." It would seem that there might be an increase in the income of the borrower, and this is the all important consideration.

The book is planned on the basis of the meaning, logic and practice of agricultural credit, but with no descriptions of the various systems at work other than what is contained in occasional sentences and incidental allusions. The author has chosen the more difficult task of exposition and analysis in contrast with the easier work of narration and description. It would, no doubt, be more useful to American students if it included, along with the discussion of principles, enough description of the results obtained in practice to enable the reader to form some judgment of his own as to the merits of the various plans and facilities somewhat independently of the conclusions expressed by the author.

The style of the book, so far as English is concerned, is unfortunate. That the author, for a foreigner, has a good command of the language, is evident. Nevertheless, the book abounds in unidiomatic expressions, while the diction and structure are so awkward at times as to make the meaning obscure, if not, now and then, uncertain. The work is, withal, of high grade, and will prove useful as a reference in connection with farm credit in this country, both within and without academic circles.

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War Debts and World Prosperity, by Harold G. Moulton and Leo Pasvolsky. New York: The Century Company. 1932. Pp. xx, 498. $3.00.

This volume is in a sense a synthesis of the results of ten years of study by the authors and their associates in the Brookings Institution. This institution has already published several volumes in this field beginning with *Germany's Capacity to Pay* in 1923. This latest work recapitulates the story of the various interallied loans, the reparations "settlements," the debt "settlements," the successive break-downs, including the causes and the results thereof. Naturally most space is given to the matters in which Americans have the greatest interest.

In conformity with the established methodology of the Brookings organization, this volume sets its task at the outset by asking "two fundamental questions":

(1) "Would a complete obliteration of all reparation and inter-allied war debt obligations promote, or retard, world prosperity?"

(2) "Would collection of these intergovernmental debts be economically beneficial to creditor countries?"

In view of the importance of the problems involved and the great interest in them, a longer summary than usual may be justified. Following are some of the outstanding points made.

At least 28 countries are involved in war debt relations: all the belligerents except Turkey, all the European neutrals except Spain and, in addition, the United States and Japan. Of these countries, 13 are both debtors and creditors; 10 are net debtors, and 18 are net creditors.

The aggregate intergovernmental war debts, principal and interest, as of July 1, 1931 were $52,741,547,000. The countries having the largest amounts involved are shown in the accompanying table.

INTERGOVERNMENTAL WAR DEBTS, JULY 1, 1931
(In millions of dollars)

Country	*Credits*	*Debits*	*Net*
Belgium	1,454	849	+605
Czechoslovakia	1	425	—424
France	13,856	10,497	+3,359
Germany		25,609	—25,609
Great Britain	10,685	9,754	+931
Italy	4,057	3,572	+485
Poland	4	666	—662
Rumania	447	422	+25
United States	20,823		+20,823
Yugoslavia	874	338	+535

During the period prior to April 1, 1917, when we entered the war, the British and French governments acted as bankers for the Allies. France became a debtor to Great Britain; and both of these countries and Russia floated loans in the United States but did not become debtors to our government. Before we entered the war, Great Britain had borrowed $1,065,000,000; France, $694,000,000; and Russia, $136,000,000 in the American market. All or nearly all of this was in the form of credits in American banks upon which the borrowers drew to pay for imports of war supplies.

When the United States entered the war, the United States Treasury undertook to supply the allied governments with funds to meet necessary payments in this country. This policy was considered preferable to per-

mitting the Allies to compete in floating loans and making war purchases in the American market. Congress authorized the purchase of foreign obligations not in excess of $10,000,000,000. Approximately $8,000,000,000 of credits were established, though only a little over $7,000,000,000 was actually advanced in cash before the Armistice. During this period, April 6, 1917 to November 11, 1918, Great Britain's loans from the United States exceeded her loans to her allies by nearly $500,000,000; and the borrowings of France from the United States and Great Britain exceeded her loans to continental allies by about $1,500,000,000.

In the two years following the Armistice, the American government loaned the Allies over $3,000,000,000 for liquidation of war accounts, interest, reconstruction, and relief. During the war interest on these loans was paid out of new borrowings and following the war it was allowed to accumulate. Most of the debt increase following the Armistice was due to this accumulation of unpaid interest though a considerable part arose from the sale of surplus American war supplies to France on credit.

All told, the United States government made war loans of about $10,000,000,000; British government loans reached about $8,000,000,000, offset by over $4,000,000,000 borrowed from the United States and also by gold shipments to Great Britain by her allies. The French government loaned about $2,500,000,000 to her allies but borrowed nearly twice that sum from Great Britain and the United States. All these loans were almost exclusively for war purposes and chiefly, but not wholly, for financing purchases in the creditor countries. Substantial parts of loans from the United States were used for the "pegging" of sterling and French exchange.

The American and European views of war loans were quite different. Our people and officials believed that the American loans would shorten the war and in this way be of advantage to America as well as to the Allies. We did not, however, look at these funds as free contributions but rather as straight-forward loans to solvent nations who would repay them with interest in good time and thus put no extra permanent burden upon the American taxpayer. While the Allies at first accepted this point of view with respect to their borrowings from the United States Treasury they regarded the loans among themselves as subject to adjustment along with other matters that would be liquidated at the end of the war.

The United States Treasury took great care to secure evidences of indebtedness for every dollar loaned and to make clear to the debtors that it expected payment in full, regardless of other problems the war might raise. Great Britain, on the other hand, was very unbusiness-like in this respect but extremely careful in scrutinizing the needs of the borrowers and the purposes for which they used the funds.

Shortly after the Armistice the French and British began their efforts to win over United States officials to the idea of throwing the debts into the general peace negotiations. Secretaries of the Treasury Glass and Houston, President Wilson, and their various representatives held consistently to the position that America expected its loans to the Allies to be paid regardless of what arrangements European countries might make among themselves about reparations and other matters. Unequivocally and repeatedly, both before and after the signing of the peace treaty, they

refused to yield to the insistent pressure from the French and British governments to throw these debts into the general discussion of war and post war settlements. President Wilson's and Prime Minister Lloyd George's impasse over this matter in 1920 led to the interruption of negotiations until 1922.

In June 1921, not long after President Harding took office, Secretary of the Treasury Mellon asked Congress to grant him plenary powers to make settlements with the debtor governments of Europe. Congress flatly refused to do this but authorized the President to appoint a War Debt Funding Commission of five members (subject to Senate approval), of which the Secretary of the Treasury was to be chairman. Congress put various limitations upon this commission. Among other things it was specifically provided that the commission was not authorized to permit the "cancellation of any part of such indebtedness except through payment thereof," nor to extend any maturity beyond June 15, 1947 (maturity of First Liberty Loan), nor to accept an interest rate of less than 4¼ per cent (maximum rate on Liberty Loans, though European war debts to the United States were then carrying a 5 per cent rate).

France was the first important debtor government whose representative appeared before the commission (summer of 1922), not to negotiate a settlement but to protest the terms set up by Congress. "The French government considers that its political debt to the federal government cannot be regarded separately from all the inter-Allied debts; the payment of it must be bound up with the general payment of all the war debts." This is the thesis to which the French government has adhered tenaciously ever since and which the United States government has refused to recognize, at least up to the time of the Hoover moratorium or possibly up to the time of the negotiations of 1933.

The American debt commission received the representatives of the various debtors and between May, 1923, and May, 1926, negotiated settlements with all the important debtor governments except Austria, but including France. But none of these agreements conformed to the terms of the congressional instructions. Most of the maturities were extended about forty years beyond 1947, and the interest rates were reduced very substantially below the minimum of 4¼ per cent set by Congress. Principal amounts were not cancelled but the same effect was obtained by reductions in interest, which over such a long period of years would amount to vastly more than the principal sums. By this device the Janus-faced Debt Commission and national administration could say to Congress and the American taxpaying voter, we haven't cancelled any of the debt and at the same time could say to the debtor governments, we've cancelled 20 per cent, 50 per cent, or 75 per cent of your obligation, varying according to the reduction in each case. Congress ratified the settlements despite the departures from its instructions.

The debtors who settled promptly got the hardest terms and, with some exceptions, those who delayed got off the easiest. Of course, any reduction in interest from the agreed 5 per cent was a concession from the letter of the bond. The governments settling early, e.g. Finland, Great Britain and others got reductions in interest rates to an average equivalent of about 3.3 per cent; Belgium to 1.8 per cent; France to 1.6 per cent; Yugoslavia

to 1 per cent; and Italy to 0.4 per cent, though Italy settled five months before France. Belgium got special consideration, probably partly on sentimental grounds, though in the later negotiations "ability-to-pay" came to the fore much more prominently than in the earlier settlements. It was on this basis that Italy and some other countries got such large reductions. Apparently, the "ability-to-pay" idea was much more pleasing to France seven years ago than it was in 1932 when she defaulted despite her huge holdings of gold.

The percentages of debt reduction which were granted the several debtor countries depend upon whether calculations are based upon a 5 per cent interest rate to which the debtors agreed when they borrowed the money, or upon the 4¼ per cent rate of the Liberty Loans. An even lower base rate, say 3 per cent, would be more in accord with long time rates for unquestionably solvent and eager-to-pay governments. The percentage reductions in debts made by the settlements, calculated upon a 4¼ per cent basis, were as follows for a few of the important debtors: Great Britain, 19.7; Finland, 19.5; Poland, 19.5: Czechoslovakia, 25.7; France, 52.8; Belgium, 53.5; Yugoslavia, 69.7; Italy, 75.4; average for all, 43.1. If the 5 per cent basis is used in calculations, the percentage reductions were much larger, for example, 30.1 for Great Britain; 37 for Czechoslovakia; 60.3 for France; 80.2 for Italy, and so on; average for all, 51.3.

Great Britain and France in settling obligations among their European Allies distinguished between war loans and the relief and reconstruction credits. The former were considered "political" and the latter "commercial." Great Britain advocated general cancellation of all war debts, but since American policy made this impossible, Lord Balfour reminded British Ally debtors with "the greatest reluctance" in 1922 that his government would collect from its debtors only amounts sufficient to cover its debt payments to the American government. Furthermore, it would consider ability-to-pay. It may be added that Great Britain followed the policy of almost complete cancellation of ally debts following the Napoleonic wars.

France—a net debtor on war accounts—favored complete cancellation of all such debts between Allied and Associated powers but viewed reparations—of which she was to receive more than half—in a wholly different light. In most cases France endeavored to hinge debt payments by and to her upon reparations receipts and the portion of her debt to the United States that she would be required to pay. France did not sign definitive funding agreements with her principal war debtors until 1930.

With the insistence of the American taxpayer and his representatives in the legislative and administrative branches of the government that European obligations must be paid, and with the insistence of America's debtors, particularly of France, that these debts could not be paid except as reparations and other amounts owed them provided the means of payment, the solution of the entire war debt and reparations problem hinged upon the payment of reparations by Germany, or upon the cancellation of European government obligations to America.

It is the thesis of the authors of the volume being reviewed that the payment of large external government debts requires: (1) that the debtor country shall be prosperous enough so that taxes may be collected in order

to secure the wherewithal to pay and, furthermore (2) that huge sums cannot be transferred abroad year after year unless equivalent sums may be secured by the export of goods abroad. Corollary to this, creditors cannot be paid if they will not receive payment, that is, if they will not permit an excess of imports over exports. The war upset the economic equilibrium of the world; the regaining of normal balance would have been difficult even had there been no reparation or other external debts. The main *net* flow of wealth required by the post-war settlements, however, was from poorer countries to richer countries, mostly from Germany via the Allies to the United States.

In the main, various labor and business interests in the several countries objected to receiving payments in kind or imports in excess of exports; in fact, all sorts of tariffs, quotas, and other devices were used to prevent payments in the form of imports. It is true that for a time various creditors, particularly the United States, recklessly floated huge loans in Germany and other debtor countries while following the exactly contrary or inconsistent policy of increasing trade instrictions. The policy of trade strangulation and the political manipulation of credit have not only thrown the debtor nations deeper into the mire, but have also reacted adversely upon the creditor nations. It is true that American taxpayers will have to pay more taxes if the European debtor nations fail to pay their debts, but they have lost in income far more han the amount of such debts by the failure to unite in a wise and comprehensive international economic policy. Tax paying is relatively easy when the country is prosperous.

So the two fundamental questions are answered unequivocally as follows:

"1. A complete obliteration of all reparation and war debt obligations would promote, rather than retard, world economic prosperity.

"2. The collection of these inter-governmental debts would be economically detrimental, rather than beneficial, to the creditor countries."

"While the obliteration of the war debts would not solve all the manifold difficulties under which the world is laboring, economic analysis leads unmistakably to the conclusion that the restoration and maintenance of world prosperity will be rendered much easier if the disorganizing effects of the war debt payments are eliminated once and for all."

The authors have performed a distinct public service in presenting such a timely, clear, and convincing discussion of this very important problem.

Roy G. Blakey

University of Minnesota

Voluntary Allotment—Planned Production in American Agriculture, by Edward S. Mead and Bernhard Ostrolenk. Philadelphia: University of Pennsylvania Press, 1933. Pp. 147. $1.50.

This little volume is a sequel to *Harvey Baum, A Study of the Agricultural Revolution.* Apparently, the book was written for popular reading by urban dwellers. The plight of agriculture is serious but it may well be questioned if the cause of agriculture will be advanced by over-statement or by well-meant but overdone sympathy.

The story starts with the statement "The competitive system is break-

ing down. . . . One road leads to Socialism. . . . The other leads to controlled production. . . .'' Controlled production is advocated by the authors to restore agriculture in 1934 to what at present seems the millennium of farm prices with wheat at $1.60 a bushel, cotton at 20 cents a pound, tobacco at 22 cents a pound, potatoes and corn at $1 a bushel, rye at $1.50 a bushel, oats at 50 cents a bushel, barley at 75 cents a bushel, flaxseed at $2.50 a bushel, hogs at $8.16 a hundred and $12 a hundred for cattle. (See Table II and pages 105 and 106.) Apparently it is assumed that these prices are ''necessary to pay the farmer his average cost of production, plus a profit.''

Under the proposed voluntary allotment plan, which ''differs sharply from most published forms of the plan,'' production would be restricted to the estimated needs of the domestic market. Using wheat as an illustration, ''The tariff would have to be raised to whatever level was necessary to make the domestic price of $1.22 effective.'' The excise tax paid by processors would yield 40 cents a bushel which, when paid to the wheat farmers and added to the domestic price of $1.22, would make a total return of $1.62 a bushel. The public sentiment of the community, together with the pressure exerted by creditors, is counted on to secure thoroughgoing participation in the ''voluntary'' plan. ''It would indeed be a bold bad farmer, saturated with the traditions of original Americanism, and resistant to the pressure of local opinion, who could stand up under the barrage of such censure.''

The authors suggest that there should be ''abandonment, under the Voluntary Allotment Plan, of the greater part of our export trade in agricultural products, cotton as well as the rest.'' This would permit American manufacturers to ''Within a few years gain back their foreign markets.'' No explanation is offered as to why agriculture should abandon the use of a fair share of its physical plant while manufacturers presumably would have their plants restored to full use.

The expected benefits of the plan are described in glowing terms. ''The problem of rural taxation and rural credit would be settled.'' ''The greatest stock-market boom in history, far surpassing the Coolidge boom, might immediately follow passage of the Voluntary Allotment Plan into law.'' The latter possibility, in the opinion of the reviewer, is of questionable value as an argument for the plan. ''The farmer's standard of living has always been far below the standard prevailing in the cities.'' The authors expect a substantial recovery in rural standards of living which would be beneficial to manufacturers of sanitary ware, electric appliances, automobiles, and electric power when the Voluntary Allotment Plan is in effect. The question may well be raised whether standards of living in rural and urban homes can be satisfactorily measured in terms of the material things enumerated. There are many compensating advantages that farmers have enjoyed which, at least, make the authors' statements open to debate. Furthermore, there are farm homes of all types just as there are city homes of all types. What basis should be used in comparing standards of living and what sections of the urban and rural populations should be compared?

The reviewer has jumped from the introduction approximately two-thirds through the book to the plan proposed and omitted consideration

of the analysis of the agricultural situation which occupies seven of the ten chapters. The analysis of the situation begins with the story of Ole Swanson—a typical American farmer. After buying out the other heirs to his father's farm this typical farmer materially reduced his mortgage and educated his children. He prospered until the agricultural depression caught him and then he lost his farm and equipment. His children were all employed in urban industries and all lost their jobs and returned to the parental roof with their wives, husbands, and children until there were seventeen persons living in the six room farm home. The story, in its essential details, is all too typical of the plight of many farmers with mortgages. However, it is not typical of the more fortunate farmers with unmortgaged farms and these probably outnumber those with mortgages. Little mention is made of this group of farmers.

In analyzing agricultural income, aggregate figures for the entire country are used and conclusions are based on per farm figures secured by dividing these aggregates by the number of farms. The use of such averages is highly deceptive when one attempts to analyze the problems of so diverse and varied an industry as American agriculture.

Numerous minor inaccuracies in detail raise the question of the authors' familiarity with mid western agricultural conditions during recent years. For example, in describing the influence of the depression on rural social life the following statements are made: "One of the authors traveled during the summer of 1932 a total of 7,000 miles through the South and Middle West. He found that the return of the city children had brought to the small towns a gaiety, a sophistication, an abandon, reminiscent of the post-war period, notably contrasting with the narrow Puritanism of the old residents." Might not this tendency, where, and if, it has occurred, have taken place prior to 1929? Should it all be blamed on the return of the city children? Did the authors make similar studies in 1929 or 1928 for comparative purposes and at a time when the city children were not returning to the farm? Again, in discussing the mechanization of wheat farming the statement is made that "one man with a combine could harvest seventy-five acres" of wheat in one day "whereas one man with a seven foot binder drawn by horses could harvest seven acres of wheat in a day." Only the exceptionally large combines can harvest seventy-five acres of wheat in one day and the usual crew for such a machine, with the tractor to pull it, and one or more trucks to haul the grain away is three or four men.

In describing the return to horse drawn equipment in the wheat belt, the following statements are made: "We traveled, during the wheat harvest in July, 1932, by automobile through Kansas." "In our 600 miles of travel, during threshing season, we did not see a single combine in operation. They were stored under cover. The harvest was being done with horse-drawn binders and the grain was threshed by old threshing machines." A Kansas farmer's son who lives in the heart of the wheat belt said of these statements, "Either he missed the wheat belt or he went through in the night." The combines are used as stationary threshers where grain is cut with binders in the portion of the wheat belt where combines are owned on most farms. Furthermore, the combine was preceded by the header and not by the binder in the western hard winter

wheat belt. To return to the header required eight or ten horses and few typical wheat farmers had this number of horses. Combines were extensively used in the wheat belt in the harvest of 1932 although there was some return to horse drawn equipment.

The authors seem to be under the illusion that gasoline for power farming equipment cost 22 cents a gallon during the harvest of 1932. It was nearer one-half of this and in some instances was purchased for as low as 9 cents a gallon. The gasoline tax does not apply to gasoline bought for farming purposes in Kansas.

The statement is made that "Europe has anticipated the United States in repealing the law of supply and demand, as applied to agriculture." Apparently, what is meant is that European nations have adopted policies permitting controlled production somewhat similar to that advocated by the authors for agriculture in the United States. This is far from repeal of the law of supply and demand if the usual interpretation of this law is followed.

The book deals with issues that are tragic for many farmers. The authors show sympathy and interest but apparently lack the intimate understanding of the problems involved which would permit accurate and convincing diagnosis and prescription for the ills of agriculture.

W. E. Grimes

Kansas State College

Credit Policies of the Federal Reserve System, by Charles O. Hardy. Washington: The Brookings Institution. 1932. 374 pp. $2.50.

This excellent study of credit policies of the Federal Reserve System appears at a time when there is great interest in the ability of the Federal Reserve System to maintain sound credit conditions. It presents a careful analysis of credit policies during the period 1922 to 1931 and will be useful for all persons interested in central banking policy.

The book is divided into four parts. Part I is on "organization and practice." In this part, standards of credit policy are outlined and the technique of credit control explained in general terms. The attempts at credit control by the Federal Reserve System during the years 1922-31 also are described.

Part II, which includes a major part of the book, deals with "the major standards" which are used in credit control. The author refers to the guides of credit policy published in the report of the Federal Reserve Board for 1923 and points out that "in place of a simple test, such as a reserve ratio or an exchange rate or an index number of prices, there is set up as a standard the maximum facilitation of the production and distribution of tangible goods and the minimum facilitation of the accumulation of speculative inventories" (page 77). Mr. Hardy believes that aside from the handling of the seasonal problem of credit there is "little in the experiences of the Federal Reserve System from 1922 to 1931 to create optimism as to the probability of stabilizing business through credit control."

He discusses the aims of cooperation among central banks and the forms of international contacts of the Federal Reserve System. In his concluding remarks on international cooperation (page 117), he says, "Inter-

national cooperation has been a less important factor in Reserve system policy than is generally believed, and it is well that this is so. Aside from relatively unimportant service relationships and the more significant participation of the Reserve Banks in stabilization loans (in which the prestige of the lenders was of more importance than the actual advance of funds), the pressure to cooperate has been pressure to pursue an unsound policy in order to shield other nations from the consequences of their own unsound policies. So long as 'cooperation' is conceived in these terms the less we have of it the better."

Chapters VII and VIII deal specifically with the problem of stock market control. In Chapter VII the author discusses the technique of control and in Chapter VIII the objectives of control of the stock market. Emphasis is placed on the two views generally held regarding the influence of the Federal Reserve System on credit conditions, the first that the only important influence the system can exert is on the volume of reserve available for credit extended by member banks, and the second that by qualitative control the Reserve banks can give attention to the purposes for borrowing and discriminate against speculative demands for funds. Qualitative control which was attempted by Reserve authorities in 1929 was partially successful according to the author. In his judgment "the case for the campaign against speculation was weak." He finds no evidence that business and agriculture in 1928 or 1929 were suffering from the competition of the stock market nor evidence of the existence of an unsound credit situation judged by standards of the Federal Reserve Board, until the spring of 1929.

One of the most interesting phases of this study is the analysis of the relation of bank credit to commodity prices. Mr. Hardy points out that the price level is not readily controlled by credit manipulation, that it is difficult to get a satisfactory index of the price level and that the choice of an index involves a choice between different objectives. On the whole he sets up a strong argument against stabilization of prices and summarizes his argument by stating six reasons why he thinks the program of stabilizers should be rejected.

Part III is entitled "The minor standards." The liquidity of commercial bank assets is discussed from the standpoint of the kind of credit instruments the Federal Reserve System will purchase in the market or rediscount. The author concludes that the acceptance market has failed to function as a means of shifting funds from one part of the country to the other as the supply and demand changes for credit. Eligibility standards for rediscount of paper by the federal reserve banks which have received much attention actually have been of minor importance from the standpoint of effect on volume of credit. One is inclined to agree readily with the author in his conclusion that "From the standpoint of Reserve system control of the quantity of credit extended, detailed restrictions on eligibility will be of no consequence so long as member banks are allowed to borrow on their collateral notes, and so long as Federal Reserve Banks continue to pursue a liberal open market policy. And, from the standpoint of qualitative control, eligibility restrictions can have no great significance so long as member banks are under no pressure to rediscount" (page 277).

Part IV, which deals with "the results of credit control" is a comparatively short discussion of the quantity of credit and the quality of credit from the standpoint of sound bank policy. Here the author gives his final conclusions but the reader is perhaps inclined to wish that this part of the study had been developed more fully. With respect to the quantity of credit, Mr. Hardy concludes that "the ideal solution of the credit managers' problem is neutral money—that is, stabilization of the relationship between the supply of currency (including bank deposits) and the demand for currency, meaning by demand for currency, not the turnover, but the quantity of money and bank deposits which the country is willing to carry idle in pocket and till money balances, operating funds, and "investment deposits" (page 324). In his conclusion on the quality of credit the author argues against the traditional view that commercial banks should maintain a liquid position by making only commercial loans of short maturity and states that fixed capital instruments which are readily salable are as liquid as any loan. However, he points out in a striking manner that no loans are liquid in the face of demands on the banks as a whole. Bank failures are referred to briefly and some suggestions made for safeguards in our banking system. An appendix of statistical data and one of reading references are included.

This book is written in clear, direct style and presents a careful and sound analysis which is a valuable contribution to our knowledge of banking policy.

E. C. Johnson

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Die Getreidewirtschaft in den Trockengebieten Russlands. Stand und Aussichten, by B. Bruzkus, W. v. Poletika und A. v. Ugrimoff, Professoren am Russischen Wissenschaftlichen Institut zu Berlin. Berlin, 1932. 138 p. with 10 maps and 2 charts. Berichte über Landwirtschaft. Herausg. im Reichsministerium für Ernährung u. Landwirtschaft. Neue Folge, 67. Sonderheft.

The book published by the German Ministry of Agriculture and written by three Russian specialists is very timely. It discusses present conditions and the outlook for the future of grain production in the arid regions of Russia. The plan to extend the wheat crop area on unoccupied lands in arid regions of Soviet Russia has received great publicity and has influenced substantially the world wheat market. For this reason alone it is of importance to study objectively the conditions in which this plan has to be executed, and its outlook for the future. The fact that the book is a result of the work of specialists in three different lines makes it particularly interesting. One of the authors (W. v. Poletika) analyses in detail the climatic and geobotanic conditions of the Russian steppes, with special reference to the Asiatic part, where expansion of the wheat area has been mostly projected. He demonstrates that in spite of the east-west extension of the belt, the condition of temperature and rainfall are very far from uniform, contrary to the belief of American authorities (see C. F. Marbut "Russia and the United States in the World War Market," *The Geographical Review,* Vol. XXI, No. 1, January, 1931, p. 8). A considerable part of the black soil belt and practically all of the chestnut-brown

soils in the Asiatic area of the Russian steppes receive less than 12 inches of rain during the year, of which only about 2 inches fall in the spring months (March-May). This makes crop farming in a greater part of the Asiatic steppe area very precarious. He points, also, to the extremely continental climate of the area with very cold and snowless winters. These characteristics of climate put much narrower limits to the extension of crops in this area than might be suggested by the qualities of its soils. However, the analysis of the soils in the Asiatic steppes by another specialist (A. v. Ugrimoff) indicates that the quality of the black-and-chestnut soils here is lower than in the European steppes, because of a larger proportion of salted lands (so called solonchaki and solontsy) which can not be cultivated.

For agronomists the part of the book from page 82 to page 112 may be of interest. This discusses the practices of agriculture in arid regions developed in the agricultural experimental stations of Russia during the several decades of their existence (since 1880) which points to the possibility, with simple means at the disposition of peasants, to raise the yield per acre. Finally, Mr. B. Brutzkus analyses the activity of the "grain factories" organized by the Soviet Government during recent years with the purpose of expanding the wheat crop area, especially on unoccupied lands in the eastern arid regions of the steppe. He points out the interesting fact that the development of "grain factories," contrary to original planning was least in the arid regions of the Asiatic steppe (Kazakstan) and of the Lower Volga. Only one-fifth of their crop area in 1931 was in these arid regions with an abundance of unoccupied lands. Much the greater part of the crop area was in the less arid and more populated regions of the European Russia (The Middle Volga region, North Caucusus and even the Ukraine). This points to the fact that grain factories were organized not only on free lands unoccupied by peasants but also on lands which were and could be cultivated by peasants. Some of them were directly taken from peasants. There was not an addition of a new crop area but a supplanting of peasant farming by state farming. Such a tendency became particularly marked after 1929-30 since which time the government has been less guided in its policy by the interests of the peasantry and has, indeed, waged an open struggle against the well-to-do peasants. Brutzkus demonstrates that the state grain factories, in spite of their machine technique, appear to be no more resistant to the droughts of the arid regions than are peasant farms. In 1931 the drought greatly affected the state grain farms in the eastern regions, and several of them were abandoned and, in general, the area under the state farms in Kazakstan (central Asia) and Lower Volga was substantially curtailed in 1932. The opinion of Professor Brutzkus is that colonization of the arid steppe by peasants, combining crop production with animal husbandry, has a better outlook than the development there of the one-sided state grain farms. At the same time, it requires less financial outlay by the state. The type of farming aimed at the one-sided production of small grains is particularly unstable and unsuited to the natural conditions of the arid steppe in Asiatic Russia. And so, from the author's point of view, the plan to extend greatly the crop area of the arid regions of the Russian steppe in the form of huge state grain farms can not be recognized as successful at

the present time or as having good prospects for the future. It does not mean, he says, that these regions can not be used for crops generally. The pre-war colonization of the arid regions of central Asia has shown that peasant colonists can penetrate with their crops far into the arid regions. But this process must go rather slowly and it is impossible to expect a rapid growth of the grain production in Russia by the extension of the crop area on new lands. And the better lands with more favorable climatic conditions are already occupied even in the Asiatic part of Russia.

These conclusions are of special interest for the reviewer because they confirm his own conclusions from his study of the wheat problem in Russia,[1] especially because the conclusions of the authors are based upon a detailed study of the natural conditions and agronomic practices in the arid regions of Russia, problems which the reviewer could not analyze at sufficient length in his own study. The book gives plenty of objective and valuable information about dry farming in Russia, information which previously was not accessible to the people not reading the Russian language. For this reason the book should be welcomed by American readers.

V. P. Timoshenko

University of Michigan

The Tariff on Sugar, by Lippert S. Ellis. Freeport, Illinois: The Rawleigh Foundation. 1933. Pp. 190. $0.50.

This publication is a monograph, popular in style and content rather than technical. A statement in the preface by Haldor R. Mohat, Director of the Rawleigh Foundation which provided the funds for the study, gives the reader a cue to the thread running through the monograph. This statement reads: "His (the author's) findings and conclusions are interesting and impressive. It is hoped that this may offer some practical aid to those interesting in solving the farm problem." An editor's introduction, signed by John R. Commons, Benjamin H. Hibbard and Walter A. Morton, is in the nature of a summary and one gathers at once that the results of the study are not favorable to the tariff on sugar as it effects either the mass of American farmers or the mass of American consumers. Emphasis is given to the point that the sugar problem is not local but world wide.

Chapter 1 includes a discussion of world sugar production over three-fourths of a century. Changes in production incident to the war are particularly noted. There was a great stimulus to the production of cane sugar and a falling off in beet sugar. After the war beet sugar production rapidly increased and this, coupled with the large cane sugar production, led to huge world supplies and ruinously low prices. Four means of bringing about greater stability are enumerated. (1) Stabilization of production. (2) Restriction of production. (3) Campaigns for increasing consumption, and (4) The lowering of tariffs and excise duties on cane sugar. The author leads on to infer that all of these have been tried except the last.

Chapter 2 takes up the history of the sugar tariff in the United States and calls attention to 142 years of import duties, with the exception of a short period from July 1, 1792 to October 1, 1794. The effect of the free entry of sugar into the United States on production in Hawaii, Porto

[1] See Agricultural Russia and the Wheat Problem. Stanford University, California, 1932.

Rico, the Philippine Islands and the Virgin Islands is presented. In general, the author holds these producing areas have benefited from the United States tariff but that the United States producers have paid the bill. Cuba has been adversely effected to the extent that tariffs have increased world production and added to the world competitive problem.

In Chapter 3 the author goes into considerable detail with reference to the producing areas in continental United States. He points out that the sugar beet industry in the Central States is doomed unless prices increase. The sugar beet areas of western United States have an advantage over the central areas due to climatic conditions more favorable to sugar beet production. Louisiana with a shorter season than found in the principal cane sugar producing areas also produces at a relative disadvantage.

The sugar market is discussed in Chapter 4. New York is the important market in the United States and London for the world. This chapter includes considerable statistical material taken largely from Willett and Gray's *Weekly Statistical Sugar Trade Journal.* A very large proportion of the statistical material in the various chapters is secured from this source. Trade practices and other factors influencing prices are discussed at some length.

The last two chapters, comprising some 44 pages, contain the deductions that the reader is led to expect in the introduction. The author states there are three methods of measuring the effect of duty on price. The before-and-after method, which he terms the simplest and most fallacious, the equilibrium method, a highly involved mathematical deduction, and the differential method which is the one followed in the monograph. Limitations of this method are recognized by the author. He says: "It shows concretely the actual amount paid by American buyers above the world price at any given time; it does not reveal what absolute changes may have taken place in actual prices. A differential in the case of sugar, for example, does not indicate to what extent the world price of sugar may have been reduced due to increased production back of our tariff walls, or due to possible decreased consumption in this country. Nor does it explain what may happen to actual world prices if these factors, as for example the tariff, are removed." From rather extensive New York and London sugar price data the conclusion is drawn that from 1922 to 1930 the price of sugar in the United States was higher than the "world or London prices by virtually the full amount of the Cuban tariff duty" which is 20 per cent lower than the full duty.

The increased cost on sugar sold by retailers for direct consumption aggregating 75 per cent of the total, amounted in 1930 to something more than 201 million dollars. Of this total the farmers paid over 50 million dollars. The benefits to the farmers exceeded the cost by more than three million dollars, however the statement is made that if data were available on the total consumption of sugar the cost to all farmers would be greater than the benefits to those engaged in the production of sugar. In the discussion of the probable effect of reducing the tariff on sugar we find this statement: "The sugar beet would not necessarily lose the full benefit of the tariff if sugar were no longer protected, since the advantage beets will have had over alternative crops may have been only a fraction of the full duty on sugar." The author does not overlook the fact that the increased cost of sugar is not an entire loss inasmuch as large federal

revenues are secured from this source. In 1930 the import duties on sugar amounted to 42.89 per cent of the total cost to consumers.

Many of the readers of the JOURNAL OF FARM ECONOMICS will find Appendix A entitled "Methods of Tariff Investigation" by Prof. W. A. Morton of the University of Wisconsin of much interest. The approach to the tariff question used by Prof. F. W. Taussig and Dr. Phillip G. Wright are briefly commented upon. Much more space is devoted to a review and criticism of Prof. Henry Schultz's use of the "equilibrium" method in attempting to measure the effects of the sugar duty. He concludes that little dependence can be placed on the results obtained by Schultz and says: "Consequently the results obtained, so far as the data permit, are largely a result not of the facts themselves but of the author's preconception of supply and demand curves for sugar." In a further comment Prof. Morton contrasts the objectives of Schultz and Ellis.

The author of this monograph on The Tariff on Sugar has shown in a very readable manner his view of the effects of the sugar tariff on both producers and consumers in the United States, also the general and more long-time influence of sugar tariffs on world wide production and prices. An estimate in concise terms of the effect of the sugar tariff on farmers and the returns to agriculture is a significant contribution. Such information is of particular interest at this time when many federal farm relief proposals are definitely bound up with tariffs and tariff policies.

Alva H. Benton

North Dakota Agricultural College

Taxation Issues, by M. Slade Kendrick. New York: Harper & Brothers. 1933. 147 pp. $1.00.

This little book, containing only six chapters, nevertheless provides much food for thought for those interested in tax matters. The first chapter discusses increases in public expenditure which have occurred in recent decades, the second deals with present sources of tax revenue, and the fifth with the shifting and incidence of taxation. The third, fourth, and sixth chapters are the ones most likely to provoke dissent.

For example, in the third chapter, entitled "The General Property Tax," Professor Kendrick suggests that the difficulties inherent in the capital-value assessment of real estate can largely be removed by assessing on the basis of net rent. To the present reviewer this seems doubtful. The present methods of assessment are on the whole so crude that the very unsatisfactory results obtained need occasion no surprise. To change the basis of assessment is to obscure the fundamental need of securing competent assessors and of improving the conditions under which they work. Many difficulties would be encountered in computing net rent fairly in cities. In the country the difficulties would be almost insuperable. Many farms are not rented at all and few are rented on a straight cash rent basis. The careful calculation required to determine net rentals in a rural community would at the same time establish capital values with a sufficient degree of accuracy. Either basis of assessment properly requires a highly trained assessor. Moreover, real estate taxes must be deducted from gross rental in the determination of net rental, which in turn determines the amount of taxes to be paid under the proposed plan.

The author does not think that property which yields no rental should

be taxed and he would discourage speculation by a heavy transfer tax. Such a scheme would hardly be adequate in New England where the taxes on large tracts of land, worthless for agriculture, are being paid by their owners who hope to sell the land for residence purposes at a future date. In the meantime the presence of this idle land in the towns increases considerably the local expense for roads and transportation to schools by separating settled areas. The local government is much more likely to finance itself well with regular revenues than with revenues to come in the future at unexpected times.

The fourth chapter discusses relations between state and local taxation and the question as to whether grants-in-aid should be distributed according to the principle of equalization or of reward of effort. Some attention is also given to the matter of shared revenues, the cases where the state collects certain taxes and divides with the units of government in which the tax has been collected. The question of the redistribution of functions between the state and its subdivisions is dismissed with a footnote, and yet this phase of the matter is attracting much interest at the present time because of the feeling that as much restraint as possible should be put on the continued expansion of local governmental expenditures. When a town, city, or school district receives funds from a state or federal source the effect is usually to encourage rather than to check the expenditure of local tax money. Most states are giving a great deal of local aid now either by state grants or on the basis of shared revenues. A reallocation of functions in the effort to give increased help to local units of government would take from them functions that could be more efficiently performed by the state without encouraging increased local expenditure. State highway departments are in position to build local roads much more cheaply and efficiently than can towns or counties. Another problem of much more than local significance is that of the support of education. It is also the largest item of cost. If the states were to take over the entire field of secondary education, they could organize high schools into more efficient units than now exist, besides relieving property of the occasion for much taxation.

The final chapter deals with the construction of an ideal taxation system and contains some excellent suggestions. The author's approach is from the side of governmental expenditures, his thesis being that "*Whenever the benefits arising from a particular governmental expenditure can be allocated to a particular tax source, that tax source should pay for this expenditure.*" The allocation should not be to individuals but to economic groups and all taxes for revenue should be on the expenditure basis instead of the general property tax alone, as at present. The author emphasizes the injustice of having the expenditure basis for property taxation, rates rising as governmental costs increase, while the rates of the income tax and of business taxes generally are fixed by law and change slowly if at all.

This book does not attempt to deal with all phases of taxation but only with those of the most vital interest at the present time in the field of state and local taxation. The entire book is most enlightening and stimulating whether the reader is inclined to agree or disagree with the ideas presented.

George B. Clarke

Connecticut State College

Research in Marketing of Farm Products: Scope and Method, J. D. Black, Editor. New York: Social Science Research Council. 1932. Pp. 221. $1.00.

This report includes introductory material describing the uses, scope and method and the objectives of the report, three general articles and outlines of fifty projects. Sixteen additional projects are listed by title only. Professor Black contributes two articles entitled: "Marketing as a Field of Research in Agricultural Economics" and "General Methodology of Organization Analysis." Professor Price and John M. Cassels contribute a third on: "History of Research in Marketing and Current Trends." In all 40 persons contributed to the report. Twenty-six of these represented 15 state universities or colleges, 3 represented other educational institutions, 9 the U. S. Department of Agriculture, the Farm Board, or agencies affiliated with the Government, and 2, commercial or cooperative agencies.

For whose use are these reports intended? The editors answer the questions about as follows: They are for directors of experiment stations, for those responsible for research work in agricultural economics and rural sociology in land grant and other institutions, for graduate students and teachers and for the general guidance of research workers in the field of agricultural marketing.

It seems likely that the greatest value of the report will be to individual workers for it contains many interesting observations on what needs to be done and how to do it, not the least valuable of which are contained in the footnotes giving the comments of some members of the advisory committee. However, one wonders after perusing it just how much programs of research in marketing will be modified by this effort. We have here laid out a menu of projects listed in nine courses, displaying in all its variety what the editors consider to be the significant work in marketing research in the last two decades with some valuable suggestions as to gaps which need to be filled. Will various research programs forthwith be modified to fill these gaps? It seems unlikely to the reviewer. Individuals may pick up ideas and that will be all to the good, but programs will likely go on much as they have been established. The following reasons may be listed for this: The period of expansion of the 1920's is obviously over; the present workers have established projects, many of which are described in the report; new projects will be selected largely because of the existence of some problem which new conditions have brought to light or which must be studied because of local circumstances. For example, two Illinois problems which now seem important are the reorganization of a milk shed because of changes in transportation and an analysis of the problems caused by growth of local livestock markets. Both require fundamental research studies. This report is largely a compilation of projects which research workers have thought in the past or now think to be of importance, largely because of their personal attitude and training or because of particular situations in which they worked. Merely listing and describing sixty such projects do not help in the problem of integration of programs both within institutions and between institutions or in sifting out what are the basic and fundamental rather than the ephemeral, these being two outstanding needs in connection with planning marketing projects at this time.

Since research work is in the last analysis the product of individual workers, however, and this survey contains much which should be of value to them, its value is assured.

Obviously all of the variety of ideas set forth by the different contributors cannot be discussed in the brief review. The list of contributors and topics seem to represent adequately the research work in the field. Many of the projects are outlined in too much detail, and, as noted above, more space might have been devoted to appraising their relative significance and outlining programs of integrated research.

One of the most interesting sections is that in which Professor Black analyzes the need for and problems connected with the general methodology of organization analysis. Here is presented a plea for more detailed and penetrating studies into the problems in business organization which marketing enterprises represent. Two general methods, the comparative and the synthetic, are set up and described. The importance attached to this general subject is suggested by the fact that roughly 40 per cent of the report is devoted to it. Roughly this general field represents to marketing what farm management represents to agricultural production. This reviewer should like to suggest the opinion that real progress in connection with this general subject will be made not by detailed statistical or accounting analyses which compile large masses of facts or even establish interesting principles, but rather by realistic pointed studies made in full cooperation with the operators which aim to answer specific practical questions. If generalizations result so much the better, but the vital thing is the answer to specific problems. Observations made in connection with both marketing and farm management investigations can be cited to support this opinion. Such studies may limit the scope and the size of published reports but they will increase the usable product and more adequately justify their support.

Some of the most productive work in the marketing field will be made by those workers who have the capacity of working on a basis of mutual confidence with men engaged in the industry who are actually handling marketing problems. Professor Erdman and Black both describe projects which adopt this approach (No. 1 and No. 22). Such an approach, if really scientific work is to be done, requires a high degree of ability on the part of the researcher in that he must obtain the confidence of the men in the trade and yet maintain an objective point of view.

L. J. Norton

University of Illinois

Research in Rural Organization: Scope and Method. By J. D. Black and C. C. Zimmerman. New York: Social Science Research Council, 1933. Pp. 160. $0.75.

Bulletin No. 12 of the series on *Scope and Method* prepared under the direction of the Advisory Committee on Social and Economic Research in Agriculture is similar in form to those which have preceded it and not essentially different in the nature of its content. Dr. Zimmerman who has collaborated with Dr. Black in the preparation of this report has included a brief introduction in which he outlines the purposes of the report, the theoretical basis of rural organization research and a brief history of research in rural organization. This is a neat and valuable introduction.

The topics listed in this report have been grouped under four main heads. The first includes those dealing with area and ecological organizations. Some noteworthy contributions have been made in this division, especially by Dwight Sanderson. The second section includes projects dealing with special-interest and related organizations. Most of the projects in this section have been treated by workers who apparently know their field and have been able to make some very definite contributions by virtue of their knowledge and experience. The third group deals with relationships of organizations to institutions and social environment. The intention of this section is evidently to suggest some means of analysis of the interrelations between the different types of units and kinds of organizations. It is noteworthy that of the nine projects listed in this group, only three have been developed. The others are simply "listed." The fourth group is entitled "General and Miscellaneous," and contains several suggestions that are of interest and of value especially because of their novelty. For example, the "Unutilized Human Resources of an Area" by T. Lynn Smith, or "Community Differences in Degree of Organization" by J. H. Kolb.

The bulletin justifies itself as a concise statement of the type of work that is either under way or projected in the field of "informal" and "formal" rural organization.

R. W. Murchie

University of Minnesota

Rural Social Trends. By Edmund de S. Brunner and J. H. Kolb. New York: McGraw-Hill Book Co., 1933. Pp. ix+386. $4.00.

Students of rural life who read Chapter X of the report of the President's Research Committee on Social Trends have awaited with some eagerness the promised monograph containing the detailed analysis of the data on which that brief chapter was based.

Rural Social Trends presents a mass of new data such as is seldom presented within one volume. The Committee was fortunate in being able to enlist the cooperation of the Institute of Social and Religious Research and in securing the services of two such scholars as Doctors Brunner and Kolb. The cooperation of the Institute made it possible to secure comparable data covering a large number of communities previously surveyed by that organization in either 1921 or 1924, and the pooling of the resources of two research organizations enabled more work to be done than otherwise could have been undertaken. The report, therefore, presents a picture of the rural social trends based on field studies located in every major region of the United States and presents a comparative study on a scale never before attempted in the rural field.

The first chapter deals with rural population and its chief contribution is in the rather detailed analysis of the population of 177 villages for which specially tabulated, hitherto unpublished, census data are given. The second chapter on Country Life and Agriculture is somewhat prosy but contains some new data on the social organization within 140 villages previously studied. One might have expected a somewhat fuller treatment of the "Changes in Ways of Farm Family Living" or even the separation of the material on Standards of Living from the material on Agricultural

Production, but no doubt, time and space were limiting factors. Chapters three to five which deal with village growth and the interrelationships of country, village and urban people and institutions have provided data which should answer, at least so far as it can be answered, the question of the growth or decline of the importance of the agricultural village in the United States. Previously the "arm-chair" sociologist had been able to maintain his thesis that the village or small country town was slowly dying. The result of the present study points in the direction of a steady growth or at least a stabilization of the agricultural village. Changes there will be, but changes in function rather than in the relative importance of the agricultural village as a unit in social organization. Chapter six deals with Merchandising and Credit Services. It sets out the number and types of business organizations found in villages and other trading centers patronized by the agricultural population. Chapter seven deals with changes in the educational system both formal and informal, and notes, with respect to the formal education, that there is a continued trend toward consolidation and increase in the proportion of country pupils cared for in the village schools and concludes that the tendency for the rural dweller to depend more and more on the village for educational facilities for his children is likely to continue for both elementary and high school and "probably at an accelerating rate." The chapter on Religious Agencies and Services is well written and presents many interesting conclusions regarding the rural church. "The last decade has seen both gains and losses. In the main, there is less local competition, though the competition through home-mission aids is more acute. There are more cooperative enterprises. Memberships have grown, but have not kept pace with population; so that the Protestant churches especially are reaching a smaller proportion of the population than formerly. Interest, measured by the proportion of inactive members and by attendance, has declined somewhat. Budgets are slightly larger; but because of large memberships rather than on account of increased per member giving. Pastors' salaries absorb a larger, benevolences a smaller, proportion of total expenditures. The church organizations and programs are probably more effective, and their contribution to the total life of the community is probably greater" (page 241).

Chapter nine deals with social and recreational organizations and presents new data on the 140 villages showing the change in the types of social organizations and change in functioning which have taken place within the last decade. The chapter on rural social service contains less of importance than might be expected and it is hardly likely that this chapter will satisfy those whose interests are in rural social work. The chapter on local government, although brief, is to the point. The final chapter, "1930 and After," raises many of the questions which are agitating rural-minded folk today and while the authors do not attempt to prophecy, the reviewer has no hesitation in saying that the careful reader of this book feels better fitted to plan for the future.

Occasional minor errors have been allowed to creep into the text. These are chiefly connected with the interpretation of statistical data. For example:

"The declining birth-rate is proven by the changes in the ratio of chil-

dren under ten years of age to females twenty to forty-five years of age in the sample villages. The ratio declined from 99.6 in 1920 to 95.7 in 1930. The drop has been quite sharp in all regions, except the Middle Atlantic where the increased number of children is doubtless associated with the gain in the proportion of both men and women twenty to forty-five years of age in the total population'' (page 22).

The first two sentences are perfectly correct but the attempt to explain the exception is rather weak since it would explain a higher ratio by a larger denominator or base. The thing to be explained is not the increased number of children but the increase in the ratio of children to child-bearing women.

Another example of loose interpretation of statistical material is found in the section on Village Growth (page 84). After demonstrating very conclusively by frequency tables a marked stability in population, the authors proceed, ''This tendency is indicated still further, and in rather a convincing manner, by a series of high correlations given in Table 34 where 1910 populations are correlated with 1930, 1910 with 1920, and 1920 with 1930.'' Now these high correlations are indicative not of stability but of uniformity within the census division. If, for example, one thousand of the Middle Atlantic villages had tripled their population within one period, the correlation coefficient would be .99 for that period and similarly if one thousand of them had reduced their population by fifty per cent, the correlation coefficient for the period would be almost unity. It is noteworthy that in this table no correlation coefficients are given for ''all divisions,'' although practically all other tables include this caption. Had these been calculated they would probably have shown the error of the interpretation given.

These, however, are minor defects and do not detract much from the value of the volume. Students of rural economics and rural sociology will find much stimulating material in this report, and no research worker can afford to be ignorant of its content.

R. W. Murchie

University of Minnesota

Der Schlepper in der Landwirtschaft (The Tractor in Agriculture), by N. Jasny, Berlin, in Berichte über Landwirtschaft, Neue Folge, 62. Sonderheft, Verlag Paul Parey, Berlin. 1932. Pp. 155.

There are over a million tractors in the agriculture of the United States and only 15,000 agricultural tractors in Germany. Such a sharp contrast is scarcely to be found in any other industry. Many are satisfied to explain this great difference on the basis of the difference in wage levels of the two countries and the large number of small farms in Germany. These two factors are recognized as important, but Dr. Jasny believes one must look elsewhere for the complete explanation when he observes, first, that Russia, with a much lower wage scale than Germany, has in excess of 150,000 tractors and is well on the way to completely mechanize the total agricultural area in the next few years, and second, that even the large farms of Germany use only a fractional part of the number of tractors which are used on farms of similar size in the United States.

The book is divided into two parts: (A) The Tractor as Power in

Agriculture, which deals in the main with a presentation of principles and relationships, and (B) The Tractor in Individual Countries, which gives a descriptive as well as analytical presentation of the use of tractors in the various important countries of the world. Part (A) is divided into five chapters which bear the following headings:

I. Description of the tractor
II. Relation of tractor performance to horse performance
III. Costs of power
IV. The tractor as power in agriculture
V. Changes in capacity of the tractor to compete with the horse

Countries which are discussed in part (B), are:

I. United States
II. Canada, Australia, and Argentina
III. Union of Soviet Russia and the Danubian Countries
IV. Germany

The author draws heavily on both the Agricultural Engineering and Farm Management literature of the United States for data to substantiate or disprove his various hypotheses primarily because of the abundance of such literature in this country, and a rather general deficiency in other countries.

At the beginning of Chapter III it is pointed out that fixed costs predominate when animal power is used and variable costs predominate when mechanical power is used. This simple fact is considered of cardinal importance in determining whether or not a tractor can be used advantageously under a given set of conditions. As a general rule, the proportion of fixed costs is greatly increased by mechanizing industry, but in agriculture the reverse effect is obtained in high degree. With high fixed costs, it is important to have a rather continuous power demand throughout the year. Thus, if the climate and in turn the type of farming cause the demand for power to be highly seasonal, the tractor, with its large proportion of variable costs, will have an advantage over horses; other factors, of course, not being considered. Under conditions in Germany, on the 1929 price level, tractor power per horse-hour-equivalent was cheaper than horse power up to about 700 hours use per year (comparing a typical high-cost tractor with typical low-cost horses). For periods of use in excess of 700 hours per year, horses held the advantage. When low-cost tractor labor was compared with high-cost horse labor, the tractor maintained the advantage until a usage of about 1400 hours per year was obtained. Beyond a usage of 1400 hours, even the high-cost horse labor had an advantage over tractors, when only power costs were considered.

The man labor saved by replacing horses with a tractor depends upon the tractor size and the number of horses commonly hitched together in a team. There is a tendency to enlarge the size of teams as the wage level mounts. By the enlargement of teams in high-wage regions, the labor savings obtainable through the installment of tractors are greatly reduced. The difference in wage levels between two countries, therefore, fails as a satisfactory explanation of the differences in distribution of tractors. High wages do favor the use of tractors, but more significantly through their indirect effect upon farm specialization than through their direct effects on the labor account.

Dr. Jasny thinks the tractor appears profitable in all parts of the United States. Its use, generally speaking, is favored by a high wage level, more or less specialized types of farming, a climate which does not permit year-round use of power, and a low purchase price as well as low costs for repairs, fuel, and oil. Canadian conditions, insofar as they affect the utilization of the tractor, are almost identical with those of the United States. In Australia, horse labor is cheaper than in North America while tractor costs are higher, nevertheless, prior to the price break in world grain markets, tractors were rapidly replacing horses. Public opinion in Australia frowns upon the use of tractors. This opposition is made manifest by a burdensome tariff on tractors, fuel, and oil. In Russia, motives entirely aside from the comparative costs of animal and mechanical power are responsible for the rapid mechanization of the agriculture. Soil and climatic conditions favor the use of tractors in Russia, but there are tremendous organizational problems yet to be solved before the tractor can be heralded as a success. The mild climate of Germany, which permits a more continuous use of power than in the other countries discussed, together with a highly diversified system of farming and great emphasis on livestock enterprises, makes the utilization of tractors less promising. On farms having a highly seasonal power demand, tractors may be used advantageously to overcome the peak requirements (als Spitzenbrecher). Cooperative ownership of tractors and tractor implements may offer a satisfactory solution of the power problem for small German farmers.

Dr. Jasny recognized well the shortcomings of his data and made absolutely no claims for exact accuracy in his calculations. He sagely remarked that errors in economic data are of definite importance only when, in drawing conclusions from the data, the errors are overlooked. The author said he was not so much concerned with the numerical results of his calculations as with the discovery of a correct method for the presentation of his calculations. In this objective he succeeded remarkably well.

Research workers who are studying the farm power problem would do well to examine this contribution. The grammar will be found a bit obstinate in places, but the 22 charts included are clear at a glance.

R. I. Nowell

Bureau of Agricultural Economics

Principles of Marketing, by Fred E. Clark. Revised edition. New York: The Macmillan Company, 1932. Pp. xv+657. $3.75.

Many changes have taken place in marketing since the first edition of this book was published in 1922. Greater specialization in functional development of marketing; new modes of transportation; innovations in organization and operation of retail establishments; and changed relationships of government to marketing are some of the important developments that make the subject matter of marketing different from a decade ago. The purpose of the author in making this revision has been to incorporate these and other developments in the earlier discussion.

The outline of the first edition has been essentially maintained. "The material has been built up around the original structure, and the general approach and method of treatment have been retained. And so, although the book has been entirely rewritten—with the exception of two chapters

—the revision consists largely of more thorough analysis of fundamental problems and principles, and the addition of factual data and illustrations, which continuous observation and research on the part of the author and of many other students have brought to light."

The book still retains then the same advantages for text purposes as the first edition. Its lucid style, occasional graphic illustrations, and frequent footnote references make it well suited for text material; and the functional approach makes it adaptable to detailed description of marketing organization and marketing processes. The book is somewhat lacking in the principles of business organization and market price, however, for marketing courses that emphasize business organization and management problems of marketing.

Although the discussion of many topics has been enlarged upon and improved, the subjects of retailing and costs of marketing merit special mention. The analysis of retail distribution has been expanded from two chapters to three and now contains in the third chapter the best discussion of recent developments in retailing that has come to the reviewer's attention. The section on costs of marketing has likewise been enlarged upon and shows the influence of the large amount of research that has been done on this subject in recent years. Although the significance of cost analysis is not as fully developed as the subject matter warrants, nevertheless most of the elements of efficiency in marketing are suggested and the section undoubtedly is the best presentation of the subject found in any text in marketing.

In view of the skillful manner in which the new materials have been incorporated in the structure of the original edition and the greatly strengthened analysis, this revised edition should have increased usefulness as a text for courses in general marketing.

H. B. Price

University of Kentucky

Problems of Rural Ceylon, by Wilmot A. Perera. Associated Newspapers of Ceylon, Limited (Colombo) 1932. Pp. 34.

This book is a collection of newspaper articles written for the Ceylonese newspapers and later published as a book, the profits from the sale of which are to be used for rural reconstruction work. It deals with the problem of size of land holdings, the laziness of the peasants, malaria, food supply, the sugar industry, cattle pasture, cooperative marketing, rural education and rural reconstruction. Its general temper is something similar to some of the earlier writings in rural sociology in America in that it is a peculiar combination of the dogmas of classical economics, of faith in commercialized agriculture and of common sense observations. In addition, it repeats the so-called "legume myth" for the control of malaria.

Of the one billion, eight hundred million human beings in this world, it is estimated that eight hundred million suffer from malaria and two million persons die from it each year. Most of these malaria cases are in rural districts and a high proportion of the people of semi-tropical Asia have it. Thus, it is one of the greatest of the world's rural problems. The parasite of the disease destroys the red blood corpuscles so that the tempo of life in such regions is very slow. In India, at least, there appear to be

five or six year cycles of infection depending upon the relative immunity of the population. The importance of the disease for southern Asia is due to the fact that its most successful agriculture depends upon irrigated crops, particularly rice. These are the very areas where mosquitoes are most numerous and where malarial-carrying varieties may make life very difficult. This explains why, in spite of the so-called "over-population" of Asia, many areas of its potentially most productive lands are untenanted. Thus, the Island of Ceylon, which has played such a great rôle in Indian history, has large areas which were once farmed intensively which can no longer be used. Drainage is impossible because the water (as an agent in production of rice) is one of the most important assets of the soil. To meet this situation, quininization and the use of mosquito nets have been suggested but neither have solved the problem. One of the reasons is because the cinchona tree has been allowed to disappear from many sections of Asia and refined quinine as bought in the market is very expensive relative to the purchasing power of the Asiatic peasant. In recent years a theory has been developed by Krysto and d'Herelle that mosquitoes which feed on legumes do not carry malaria. This is contested by other students of the disease. The re-appearance of this idea in Perera's book and the economic importance of the idea, if it be true, leads one to suggest that it be given a careful test or thrown out of court.

Perera's little book is interesting but should be read along with some good history of Ceylon, particularly of the so-called Kandy civilization and the other great Buddhists cultures which once existed there.

Carle C. Zimmerman

Harvard University

Estimation of End-Year World Wheat Stocks from 1922. Wheat Studies of the Food Research Institute, Vol. IX, No. 5, February, 1933, and

Price Relations Between July and September Wheat Futures at Chicago Since 1885. Wheat Studies of the Food Research Institute, Vol. IX, No. 6, March, 1933.

These two publications are a continuation of the valuable series of wheat studies being made by the Food Research Institute. The first mentioned study gives students of the wheat market a much needed figure for end-year world wheat stocks. It is judged that the ordinary "world visible supply" figures account for only about one-fourth of old-crop wheat available at the end of the crop year in the northern hemisphere. The publication gives a full description of the methods employed in making estimates. Granting, as the author does, that such estimates are far from satisfactory, they must be much better than data commonly used which do not include even an estimate of important stocks of wheat known to exist. Certainly, the figures previously available were so inadequate that this is a case of where it is better to have estimated and lost than not to have estimated at all.

The second publication mentioned above is a technical price study of an important inter-option spread in wheat futures. The Chicago July-September spread is analyzed for the period 1885 to date of publication. The appendix contains the data for weekly spreads during the life of the two futures in each year 1885 to March 1933.

Two important methods of estimating the size of the spread in June when the so-called "shift to a new crop basis" usually takes place, are developed. "The simplest and perhaps at present the most reliable basis for estimating changes in July-September spread, after trading in the September future has started, is provided by the seasonal tendencies in the spread," says the author, Holbrook Working. This is music to the reviewer's ears, because he has so long maintained the value of properly classified seasonal trends in forecasting larger and more distant trends but has found but few sympathetic ears.

The second method of estimating the spread is on the basis of the total carryover of wheat in the United States as of July 1. A table is given showing that if total stocks as of July 1 are above normal, or about 120 million bushels, by more than 100 million bushels, then the September future is expected to be over the July future as much as 2¾ cents a bushel in late June. Similar computations are made for other size stocks down to where stocks are 60 million bushels below normal, when it is expected that September will be under July by 6¼ cents. This publication is an important contribution to the more realistic, institutional, and sequential approach to price determination.

R. M. Green

Kansas State College

Keeping and Using Farm Records by John A. Hopkins, Jr. Ann Arbor: Edwards Brothers, Inc., 1932. IX, 203 pp.

The purpose of this book is to show how to keep farm records and to develop their application in the management of the farm. Business procedure is necessary in the operation of a farm today, and this is impossible without a system of records.

The problem of presenting both a series of farm records and a method of application is attacked through the budgeting procedure. Neither the budget nor the records "can achieve its greatest usefulness without leaning heavily upon the other." The organization of the budget must progress as farm records are accumulated, and "each section of the budget must progress as farm records are accumulated, and "each section of the budget is a plan for a definite part of the business." Also the budget must rely upon the records both for its information and for its effective operation. The whole organization of the book leads to an intensive study of costs and returns of individual enterprises both as entities and as parts of the farm unit. This study is based upon economies, efficiencies, unit or standard requirements, and the comparative advantages of the various enterprises making up the farm system.

There are six main divisions to the book. The first deals with what is called the "preliminary" or tentative budget and the records necessary to show the set-up of the business. This includes such items as the cropping system and the livestock organization. The keeping of farm production records, farm inventories and net worth statements are also discussed.

The second part deals exclusively with "those fundamental principles of accounting which the student needs to comprehend the financial records as a whole." The principle of debit and credit is discussed and the use of the various books for double entry bookkeeping is presented. It is suggested that any student who has had a course in bookkeeping may well pass

over this part of the book. Special problems in farm accounting are discussed very completely in the fourth part of the book. The use of multi-column records forms the major part of this discussion, and justifiably so if the reviewer's experience with farmers' bookkeeping problems is similar to that of others. The use of single entry records is contrasted with the double entry system and a method of procedure is worked out for those who wish to use it.

A rather complete discussion of such physical records as feed and labor and their interpretation in terms of farm organization problems constitute the first half of part six. This is followed by a reappraisal of individual farm enterprises in the light of both physical and financial records.

The parts of the book most difficult to handle are those dealing with the analysis of farm records, part three, and the valuation of farm assets, part five. A correct interpretation of farm records is necessary if they are to be useful for organization procedure, and Mr. Hopkins has presented several angles from which the analysis may be made. He also develops the conditions in which he considers the different analyses may be useful or suggestive.

The principles which should guide the bookkeeper in the valuation of his assets are discussed most briefly and sketchily—probably a necessity in a text including as many subjects as does this one. It does give the student "rules of thumb" methods, however, that can be used satisfactorily in most cases. The fact that any one valuation may not be used to answer all farm questions with equal degree of correctness is well stressed. The problem of showing succeeding net worths of a farmer over a series of years may require entirely different valuations from that of showing the profits or losses of different enterprises within the year.

It might have added to the clarity of the presentation had Mr. Hopkins been able to carry the figures of one farm through much of the illustrative material of the book. The interrelation of the various subjects covered would thus have been emphasized. On the whole the book should be accepted as a very desirable text especially in those schools where subject matter courses dealing with these particular fields are limited.

P. E. McNall

University of Wisconsin

History of Agriculture in the Southern United States to 1860, by Lewis Cecil Gray, assisted by Esther Katherine Thompson. With an introductory note by Henry Charles Taylor. Washington: Carnegie Institution, 1933. Two volumes, xix, 1086 pp.

How can one review these two volumes? The author's reputation and the 1086 pages combine to evoke the word "monumental," and it is no mere platitude to say that Dr. Gray has added a worthy study to a valuable series. The six earlier "Contributions to American Economic History" have dealt with domestic and foreign commerce, manufactures, transportation, labor, and northern agriculture; and while they have been rather uneven in quality they are almost as valuable to the economic historian—and even to the general historian—as the census returns. They have gathered up from articles and monographs the results of special

research and have added much new research. Thus they present a picture of the present state of our knowledge, and by showing where the gaps are they serve as the starting point for more special studies.

Dr. Gray's book is the fruit of a life's work. It started, as so many other great books have done, in a doctor's thesis at Wisconsin twenty-five years ago. From a study of the southern plantation it broadened out into a comprehensive survey of Southern agriculture from the coming of the white man up to the Civil War. To examine the sources for such a survey was a labor for Hercules, but Dr. Gray has been ably aided by Miss Thompson, and has been able to consult many unpublished studies. Every reader will be amazed at the mass of material examined in the short space of a quarter of a century, and will condone an occasional rare gap in the bibliography.

The aim of the book is to describe the economic rather than the technological aspects of the story. Dr. Gray modestly pleads inadequate training as his reason for avoiding a critical survey of the development of plants and livestock. But I suspect that the technologist will find much that is illuminating in the chapters on these very subjects. It is however with the rise of economic institutions that the book is chiefly concerned. We see the colonies planted and the conditions surrounding the birth of French and Spanish as well as English settlements. We watch the struggles to get capital, labor, and a market. We see the rise and wreck of ambitious schemes and experiments dominated by mercantilist views as to the function of colonies. Land policy and tenure, marketing and credit facilities gradually take shape; tobacco and then cotton rise up as great staple commercial crops. This brings us to the central interest of the study—the evolution and functioning of the plantation. Dr. Gray's first love occupies the central position in the book, and we have here the most thorough, competent, and critical study of the slave plantation that has yet been penned.

The plantation is one of the most interesting examples of large-scale commercial organization of agriculture in the world's history. It was for a long time America's outstanding instance of capitalistic enterprise. Dr. Gray discusses its economics with rare skill and calmness of judgment, especially in Chapters 20, 24, 28, and 39. Given the introduction of the negro, he finds the plantation "economically and socially essential," and shows how various factors favored the concentration of slave ownership. He analyses organization and costs, capitalization and credit, and carefully estimates which advantages and disadvantges were the result of slavery and which sprang from other conditions. And if he reaches the conclusion that slavery, while profitable to individuals, was ultimately pernicious to the economic well-being of the South, his reasons are those of an economist not of an abolitionist.

Like Bogart, Phillips, and other recent writers on the South, Dr. Gray does not forget that the South did more than raise exportable staples. It had its subsistence crops, its production for local markets, and its domestic industries. Probably most of the southern whites were neither large planters nor poor whites, but were medium or small cotton growers, yeomen farmers, or townsmen. Economic history has suffered badly through the confusion of the part and the whole. A manor, a gild, a

latifundium, a Medici, or a Campbell Montana wheat farm has been described and the suggestion is thereby made that such a picture is typical, representative. Where details or statistics are lacking such an error is perhaps forgivable. The remedy and the truth lie in such balanced careful studies as Dr. Gray has given us. In the future it will be more than ever unpardonable to describe the South as one vast cotton field, owned by aristocratic planters who had hardened their hearts and would not let the people go. They may tower above the landscape as mountain peaks. But quantitatively they compose only a part, maybe a small part, of the scenery. There are foothills and much plain.

Of the many other valuable items in the book I need only mention two. There are over eighty maps and tables bearing on size of holdings, production, prices, exports, etc., and over seventy pages of bibliography, containing many references to rare pamphlets, manuscripts and photostat copies in the Library of Congress and elsewhere. These increase the value of the volumes as reference works, and it is perhaps as such that they will chiefly be used. Whoever refers to them will not go empty away, whether he be theorist or historian, farm technician or economist. In Dr. Gray's generous offerings there is something for everybody.

Herbert Heaton

University of Minnesota

NEWS ITEMS

Agricultural Adjustment Administration Under Way

The Agricultural Adjustment Act was signed by President Roosevelt on May 12. That part of it of most immediate interest to agricultural economists is the title to be administered by the Secretary of Agriculture, who is empowered to adjust farm production to effective demand, as a means of restoring the farmer's purchasing power. A second part provides for a Farm Credit Administration to be administered by Mr. Henry Morganthau, Jr., as Governor, who is empowered to reduce both interest and principal on outstanding farm mortgages, and to postpone payments in case of extreme need. A third part delegates to the President the power of arranging controlled inflation, the adjustment of currency and credit to our changed needs. Secretary Wallace said of the new Act, "it initiates a program for a general advance in buying power, an advance that must extend throughout America, lightening the way of the people in city and country alike. We must lift urban buying power as we lift farm prices. The Farm Act must not be considered an isolated advance in a restricted sector; it is an important part of a large-scale coordinated attack on the whole problem of depression."

Organization of the Agricultural Adjustment Administration was begun at once with the appointment of Mr. George N. Peek, of Moline, Ill., as administrator, and Mr. Charles J. Brand, as co-administrator. Other early selections were Chester C. Davis, for many years active in agricultural organizations in the Middle West and the Northwest, as Production Administrator; M. L. Wilson, head of the Department of Agricultural Economics at Montana State College of Agriculture as Wheat Administrator; Cully A. Cobb, editor of the *Progressive Farmer*, of Atlanta, Ga., as Cotton Administrator; Guy C. Shepard as Administrator in Charge of Trade Agreements, Jerome A. Frank as Counsel; Ex-Senator Smith W. Brookhart as special advisor to promote exports of farm commodities; Oscar Johnston as Finance Administrator; and Alfred D. Stedman as Chief of Information.

Work of the Giannini Foundation

The academic year just closed has been quite the most successful in the history of the Graduate School in Agricultural Economics at the Giannini Foundation, University of California. Twenty-six students, representing every important agricultural area in the United States, have been enrolled in graduate work during the two semesters. Six of the appointees of the Social Science Research Council selected the University of California for their year's work. In addition to course work and research with the staff and facilities of the Giannini Foundation, almost all members of the graduate group took advantage of the opportunities offered by the University for study in other fields of economics. Not the least important feature of the year's program was the organization of graduate students and staff members of the Foundation into a compact group for discussion of problems in the field of agricultural economics and for carrying out a series of social activities.

Research recently completed by the Giannini Foundation in cooperation with the California Forest Experiment Station of the United States Forest Service directed at land use planning in a portion of the Sierra Nevada foothills, treats many problems common to similar efforts elsewhere. Some of these, however, were dissimilar, including complications arising from irrigation; extreme variations in land utilization; a livestock industry made especially complex by interregional use of crop and grazing lands; numerous small holdings; an intricate industrial problem, and many conflicting and complementary uses of land. Suggested remedies include public acquisition of land, farm reorganization through extension and cooperation of bankers, group action in certain phases of range management, and readjustments of certain governmental and community institutions and industries. Dr. David Weeks was the leader of this project.

A study of cooperative buying of farm supplies in California inaugurated in the latter part of 1931 at the request of the California Farm Bureau Federation is nearing completion. The study was divided into two parts. The first, made by Dr. E. D. Tetreau of the Ohio State College, who spent six months with the Giannini Foundation, dealt with the relation of cooperative purchasing by the California Farm Bureau to its other objectives and activities. The second study, made by Dr. J. N. Tinley of the Foundation, dealt with the economic phases of cooperative purchasing and the extent and possibilities of further development of buying by the cooperative associations in California. It is expected that both studies will be published shortly in bulletin form.

Dr. M. R. Benedict has recently completed a study of the tax-paying ability of the Merced Irrigation District, a 190,000-acre project in south central California. The report covers a 300-farm sample for the years 1929, 1930, and 1931 and also includes some discussion of the principles governing ability to pay. It provides a factual basis for the negotiations of the committees and attorneys representing the District and those representing the holders of its $16,000,000 in bonds outstanding which are now in default.

Edgar B. Hurd, of the Bureau of Agricultural Economics, U. S. Department of Agriculture, and Lindsay A. Crawford, of the Giannini Foundation, are engaged in a "type-of-farming" study in California. Owing to the diversity of the physiographic conditions, the great number and variety of farm enterprises, and the high degree of specialization on individual farms, the usual methods employed in the conduct of this type of project could not be used. It was found necessary to resort to field mapping in order to delineate the various agricultural areas. More than one-half of the state has been mapped up to the present time.

New Department at Illinois

A new Department of Agricultural Economics has been organized in the College of Agriculture at the University of Illinois. It combines work and personnel formerly included in the Department of Farm Organization and Management in the College of Agriculture, the Division of Agricultural Economics in the College of Commerce, and the Marketing work formerly administered by various subject-matter departments in

the College of Agriculture. At present there are four divisions within the Department: Agricultural Marketing, Agricultural Prices and Statistics, Farm Organization and Management, and Land Economics.

Division Organized at Oregon State College

Professor E. L. Potter has been appointed head of a new Division of Agricultural Economics at the Oregon State Agricultural College, the two departments of Agricultural Economics and Farm Management being grouped together for administrative purposes. Professors M. N. Nelson and H. D. Scudder will continue as the respective heads of the two departments. In a similar way all departments dealing with animals have been grouped into a Division of Animal Industry, and the departments dealing with plants and soils are grouped into a Division of Plant Industry.

Professor Potter for 20 years has been head of the department of Animal Husbandry at Oregon State College. He has given special attention to economic phases of the livestock industry, and has had wide experience particularly in the field of agricultural finance. He has recently completed two years of graduate study in economics at Stanford University and the University of California.

Research Committee for Southwestern States

At the annual Social Science Association meeting in April at Dallas, Texas, the agricultural economics section appointed a committee to organize available research information to apply directly to typical agricultural areas in southwestern states. The purpose is to arrive at a better interpretation of agriculture for both immediate and long-time economic planning. The committee consists of Dr. J. T. Sanders, Oklahoma A. and M. College, Chairman; Dr. C. O. Brannen, University of Arkansas; Professor L. P. Gabbard, Texas A. and M. College; Dr. Roy L. Thompson, University of Louisiana, and a representative from New Mexico to be appointed.

Illinois Agricultural Conciliatory Committee

Governor Horner, of Illinois, has appointed a state committee of nine members, designated as the State Agricultural Conciliatory Committee. The purpose of this committee is to consider plans for helping to relieve the farm debt situation. The committee has developed plans for establishing county farm debt adjustment committees which will assist those creditors and debtors who request help in trying to work out satisfactory adjustments of farm debt problems. The committee is serving under the direction of W. W. McLaughlin, State Director of Agriculture. Among the members are C. V. Gregory, Editor of the *Prairie Farmer*, Hudson Burr, of the Aetna Life Insurance Company, and H. C. M. Case, of the University of Illinois.

Rural Sociology Section of the American Sociological Society

At the business meeting of the section on rural sociology of the American Sociological Society, meeting in Cincinnati, December 29, 1932, the following officers and committeemen were elected for 1933:

Chairman: Carle C. Zimmerman, Department of Sociology, Harvard University, Cambridge, Mass.
Vice Chairman: Ernest Burnham, Western State Teachers College, Kalamazoo, Mich.
Secretary-Treasurer: C. Horace Hamilton, Agricultural Experiment Station, State College, Raleigh, N.C.
Members of Executive Committee: O. D. Duncan, Oklahoma A. and M. College, Stillwater, Okla. E. D. Tetreau, Ohio State University, Columbus, Ohio.

A special committee on News and Reviews was appointed by the exutive committee. It is the task of this special committee to see that more reviews of rural sociological literature, particularly recent research bulletins, are published by journals of sociology and economics. Assignments of bulletins for review are made to members of the rural sociology section from time to time by the chairman of the committee, O. D. Duncan. Other members of the News and Reviews Committee are Arnold Anderson and Theo. B. Manny.

Dr. C. E. Lively, of Ohio State University, was again appointed chairman of the research committee. The new teaching committee consists of Robert A. Polson, Chairman, Nate L. Whetten, and E. A. Willson. The extension committee consists of the officers of the Association of Extension workers in Rural Sociology.

The program for the 1933 meetings, in cooperation with the general society, will be planned around the subject of race and cultural contacts.

Dues for membership in the rural sociology section are now one dollar for two years' membership. Members who paid their dues last year will not be required to pay dues again this year.

The annual dinner meeting of the economists of western New England colleges was held May 20 at Amherst, Mass. This group includes besides economists at Massachusetts State College, sponsors of the first of these gatherings, economists of Amherst College, Clark University, Connecticut State College, Mount Holyoke College, Smith College, Springfield College, Wesleyan University, Williams College and Trinity College. The meeting was addressed by Dr. Hugh P. Baker, recently elected president of Massachusetts State College, who spoke on the subject of Trade Associations.

The Agricultural History Society held its 16th annual dinner and business meeting at Washington, D.C. on April 18. The following officers were elected: President, Dr. L. B. Schmidt, Iowa State College; Vice-President, Dr. Ralph H. Gabriel, Yale University; Secretary-Treasurer, Dr. O. C. Stine, Bureau of Agricultural Economics; Executive Committee, Miss Claribel R. Barnett, U. S. Department of Agriculture, and Dr. Percy W. Bidwell, University of Buffalo. The Society was organized in 1919 to promote interest, study and research in the history of agriculture. It now has 320 members.

Field work on a study of farm taxation and local government reorganization in Crittenden and Livingston Counties, Kentucky, was done this

spring by the University of Kentucky in cooperation with the Division of Agricultural Finance and the Division of Farm Population and Rural Life, Bureau of Agricultural Economics. The objective of the study is to determine the extent to which farm taxes in Kentucky may be reasonably reduced and the effectiveness of local government may be maintained or increased by consolidation and reorganization of such government. Mr. C. J. Bradley represented the University of Kentucky; Dr. B. W. Allin, and Dr. T. B. Manny represented the Bureau of Agricultural Economics.

The Atlantic Division of the National Association of Marketing Officials held its annual spring meeting in Washington, D.C., April 24. George A. Stuart, director of the Pennsylvania Bureau of Markets was elected chairman of the division for the coming year, and Webster J. Birdsall, acting director of the Bureau of Markets, New York State Department of Agriculture, was elected secretary-treasurer.

The legislature of Montana at its recent session abolished the state appropriation for crop reporting work in that state.

The American Country Life Association in cooperation with the Virginia Institute of Rural Affairs will hold an institute on "National Policies Affecting Rural Life" at Virginia Polytechnic Institute, Blacksburg, Va., August 1-4. Five round tables have been arranged for discussion of policies: I. Rural education, Dr. A. R. Mann and Dr. O. G. Brinn, leaders; II. Land Problems, Dr. L. C. Gray, leader; III. Agricultural cooperation, Mr. C. W. Holman and Mr. Robin Hood, leaders; IV. Rural health and welfare, Miss Grace Abbott and Dr. Harry Moore, leaders; V. International policies affecting rural life in the United States, Dr. Asher Hobson, leader. Dr. H. C. Taylor is president of the American Country Life Association, and will deliver the presidential address. Other speakers on the program include Hon. John G. Pollard, Governor of Virginia, Hon. H. A. Wallace, Secretary of Agriculture, Mr. Frederick A. White, of the American Federation of Arts, and Mr. Norman Thomas, of the League for Industrial Democracy.

Members of the department of economics and business administration of educational institutions in the Mountain States have an organization known as the Rocky Mountain University Research Council, which for two years has been compiling a report dealing with recent economic trends in the Rocky Mountain region. Dr. L. A. Moorhouse, of Colorado State College is chairman of the organization at present.

The Twenty-fourth Annual Meeting of the American Farm Economic Association will be held at Philadelphia, Pa., on December 27, 28, and 29, 1933.

An agricultural study group under the leadership of Mr. J. W. Pincus, of New Brunswick, N.J., will tour points of special interest in the Soviet

Union for two weeks, leaving Stettin on September 2, convenient for those attending the International Conference of Agricultural Economists at Bad Eilsen. Mr. Pincus has been in close contact with developments in Russian Agriculture for the past 15 years, and has spent three to six months in Russia in each of the last three years.

Mr. Joseph Ackerman has resigned as Assistant in Farm Organization and Management, University of Illinois, to accept a position with the Decatur Farm Management, Inc. Mr. Ackerman took over the work formerly done by Mr. Walter W. McLaughlin, who is now State Director of Agriculture in Illinois.

Mr. James L. Anderson, Department of Agricultural Economics, University of Tennessee, is engaged on a study of storage and warehouse facilities for farm products in Tennessee.

Mr. Paul Bestor, formerly Federal Farm Loan Commissioner, has become associated with the Prudential Insurance Company of America, and will take part in the executive direction of that company's farm loan investments. Mr. A. S. Goss, of Seattle, Wash., has been selected to take his place in the Farm Credit Administration.

Mr. Clarence A. Bonnen has returned to the Texas Agricultural Experiment Station. He has been on leave pursuing graduate work at the University of California at Berkeley on a Social Science Research Council Fellowship.

Dr. Thure Bjorkman, Secretary of the Swedish Academy of Agriculture at Stockholm, and a delegate to the General Assembly of the International Institute of Agriculture at Rome, as well as a member of the permanent committee of the Institute arrived in this country in May to study work in the Bureau of Agricultural Economics and several of the agricultural colleges and experiment stations. He expects to be in this country a few months.

Mr. R. P. Callaway, a graduate student research assistant in the department of Agricultural Economics at the University of Missouri, has accepted a position with the Doane Agricultural Service of St. Louis in commercial farm management work.

Mr. P. V. Cardon, Director of the Agricultural Experiment Station at Utah State Agricultural College, has been on sabbatical leave from that institution for the past year. He has devoted the time to graduate work at the University of California. On May 12, he was granted a Master's degree in Agricultural Economics at the University of California.

Mr. Carl M. Clark, a Social Science Research Council Fellow, has completed a year's work at the University of California. Mr. Clark was an

Assistant Professor at the Alabama Polytechnic Institute at Auburn, Alabama.

Walter P. Cotton, Department of Agricultural Economics, University of Tennessee, is analyzing some of the economic problems affecting the forests and woodlands of Tennessee.

Dr. Leo Drescher, of the University of Jena, Germany, who has been in the United States for nearly two years as a Rockefeller Fellow plans to return to Germany in August. During his stay he was in residence at the University of Wisconsin and for shorter periods was visiting at Washington, D.C., Cornell University, and Harvard University, besides touring the country in the summer of 1932.

Miss Verna Elsinger of the Ohio Farm Bureau Federation died on March 13 after a brief illness. For several years Miss Elsinger was in charge of community organization for the Burley Tobacco Growers Association. In that position as well as in her work in Ohio, she was very much interested in the membership relations and problems of farmers' organizations.

Dr. H. E. Erdman, Professor of Agricultural Economics at the University of California after six months sabbatical leave most of it spent at Brookings Institution, Washington, D.C., has resumed his duties at Berkeley. His return trip by motor included stops at Ithaca, N.Y., Chicago, Watertown, Wis., and Mitchell, S.D.

Mr. Paul L. Fletcher, assistant agricultural economist of the Virginia Agricultural Experiment Station and Extension Division at Virginia Polytechnic Institute, has been granted a year's leave of absence to become assistant manager of the Eastern Livestock Marketing Association in charge of the Jersey City agency.

Mr. Howard Golden, a graduate student in the Department of Agricultural Economics, University of Missouri, has accepted a position with the Doane Agricultural Service, but will continue his graduate work on a part time basis.

Mr. George C. Haas, of the Federal Farm Board, was one of the experts for the United States on the wheat committee of the League of Nations, which met in Geneva May 10. The other representatives of the United States were Henry Morgenthau, Sr., F. E. Murphy, and Lloyd V. Steere.

Mr. Homer J. Henney has returned to his position at the Kansas Agricultural College after spending the winter and spring in graduate work at the University of Minnesota.

Mr. J. B. Hutson, tobacco specialist of the Foreign Agricultural Service, with headquarters at Berlin, Germany, came to Washington in April for a period of leave, and for conferences with respect to his work.

Mr. Shison Chinglin Lee, having fulfilled the requirements for the doctorate in Economics at the University of Illinois, March 7, 1933, sailed from Vancouver March 11, to take up his duties as Professor of Agricultural Economics, Nankai University, Tientsin, China. Mr. Lee is under appointment in the Institute of Economics, where his specialty is expected to be Land Economics. In his work in Agricultural Economics at the University of Illinois, Mr. Lee submitted in 1930 a Master's thesis entitled, "Agricultural Land Tenure and Rent in Selected Provinces in China." His doctoral dissertation is entitled, "Farm Mortgage Credit in Relation to the Transfer of Land with Special Reference to Illinois, 1910-1932."

Mr. Allen W. Manchester returned to Connecticut Agricultural College on May 1 after spending a year's sabbatical leave at the University of California, Berkeley, California, doing graduate work in Agricultural Economics.

Mr. William E. Morgan has been on leave from the Agricultural and Mechanical College of Texas for the past year pursuing graduate work in Agricultural Economics at the University of California at Berkeley. Mr. Morgan was the recipient of a Social Science Research Council Fellowship for the academic year 1932-33. He has just returned to College Station to continue his work there.

Mr. F. A. Motz, fruit specialist of the Foreign Agricultural Service Bureau of Agricultural Economics, with headquarters at London, England, has been authorized to return to the United States. During his stay in this country Mr. Motz will make a number of trips into the principal fruit export sections.

Mr. Horace M. Newell, formerly of the Department of Agricultural Economics, University of Illinois, has accepted a position as Director of the Division of Standards and Markets in the State Department of Agriculture.

Mr. P. K. Norris, cotton specialist of the Foreign Agricultural Service Bureau of Agricultural Economics, in Cairo, Egypt, has been authorized to return to the United States. Mr. Norris has completed an intensive field investigation of the present status and future possibilities of cotton production in Egypt and the Anglo-Egyptian Sudan.

Mr. F. W. Peck, Director of Agricultural Extension, University of Minnesota, has been granted leave of absence for a year in order to become Cooperative Loan Commissioner in the Farm Credit Administration.

Mr. Carl H. Peterson, Extension Economist in Farm Management, Montana State College, has recently returned from Minneapolis where he was acting as Extension representative from Montana to examine the credit of applicants for seed loans in Montana.

Mr. Cecil J. Poole has just brought to a close a year's work under the Social Science Research Council Fellowship. He will remain at the University of California to complete his work for the Ph.D. degree.

Mr. Harry Russell resigned from the Department of Agricultural Economics, University of Illinois, to accept a position with the Doane Agricultural Service of St. Louis, Missouri.

Mr. Lyle F. Shoot, formerly of the Department of Agricultural Economics, University of Illinois, is now manager of a pure-bred hog farm in the west central part of the State.

Professor E. A. Starch has returned to Montana Experiment Station after a year's leave of absence doing graduate work at Harvard University.

Mr. T. H. Summers, Extension Economist, in Farm Management Demonstrations at Colorado State Agricultural College, was assigned to seed loan inspection work at Salt Lake City for six weeks this spring.

Mr. Fred Taylor, cotton specialist of the Foreign Agricultural Service, Bureau of Agricultural Economics, has been authorized to change his headquarters from Kobe, Japan, to Shanghai, China.

Dr. H. C. Taylor received the LL.D. degree from the University of Wisconsin at its June commencement.

Professor F. L. Thomsen of the Department of Agricultural Economics, University of Missouri, and Mr. Berley Winton, Extension Specialist in the Poultry Department, spent the month of May in New York City studying consumer preference for eggs with different colored yolks.

Mr. Ben Hur Thibodeaux has resumed his work in the Bureau of Agricultural Economics, Washington, D.C., after a year of graduate study at Harvard University on a Social Science Research fellowship.

Mr. Robert B. Tootell, Extension Land Economist, Montana State College, is doing work among the agricultural counties of the state in getting the basic data together for better utilization of county land. Several county committees are making ownership maps showing the ownership of each parcel of land in their counties so that they will be able to view the owner-

ship of several townships at once in order to visualize prospective trades and the possibilities for blocking out units for more effective utilization.

Mr. Walter W. Wilcox has resumed his work in the Bureau of Agricultural Economics after a year of graduate study at Harvard University, on a Social Science Research fellowship.

Dr. Otto Willandt of the University of Helsingsfors who is Director of the Research Bureau of Agricultural Marketing in Finland, has returned to Europe after spending several months in the United States. Dr. Willandt studied at Cornell for part of the year and later spent some time visiting institutions in the Middle West and in Washington.

J. E. Wills who was granted a Social Science Research Council fellowship for the year 1932-33 has just completed a year of graduate work in Agricultural Economics at the University of California and has returned to the University of Illinois.

DOCTORS' THESES IN AGRICULTURAL ECONOMICS COMPLETED SINCE JUNE, 1932 OR IN PROGRESS MAY, 1933

(*Editor's Note:* The following list of Doctors' theses is published in accordance with the recommendations of the executive committee of the Association. It represents the theses completed during the academic year just ended and those in progress, to the extent to which they were reported to Leland Spencer, associate editor, who assembled the information. Additions to this list should be sent to Dr. Spencer.

A list of Masters' theses completed during the year will be published in the October issue of the JOURNAL.)

Alvord, Benjamin F.—B.S., Illinois, 1923; M.S., Illinois, 1924; "An Analysis of Shifts in Agricultural Production." (Minnesota, 1934.)

Anderson, Arthur E.—B.S., Nebraska, 1912; M.S., Cornell, 1923; "Surplus Control Plans Tried or in Effect for California Crops." (California, 1934.)

Anderson, Don S.—B.S., Minnesota, 1919; "An Economic Study of the Butter Industry in Minnesota." (Minnesota, 1934.)

Ashby, Robert C.—B.S., University of Nebraska, 1908; B.A., Nebraska Wesleyan, 1910; M.S., University of Minnesota, 1916; "Local Live Stock Markets in Relation to Corn Belt Hay Producers." (Illinois, 1934.)

Aull, George H.—B.S., Clemson, 1919; M.S., Virginia, 1928; "Taxation and Ability to Pay in South Carolina." (Wisconsin, 1933.)

Beck, P. G.—B.S., Ohio State, 1924; M.S., Ohio State, 1926; "Rural Population Trends in Ohio." (Ohio State, 1934.)

Beers, Howard W.—B.S., Cornell, 1929; M.S., Cornell, 1930; "Forms of Farm Family Interaction." (Cornell, 1934.)

Blackburn, Dean W.—B.S.A., University of Arkansas, 1930; M.S., Iowa State, 1931; "Some Causes of Tenancy in the South." (Wisconsin, 1934.)

Bredin, James H., "Factors Affecting Price Differentials of Wheat in the Leading Markets." (Northwestern, 1934.)

Buck, J. Lossing—B.S., Cornell, 1914; M.S., Cornell, 1925; "Chinese Farm Economy." (Cornell, 1933.)

Brumley, F. W.—B.S., Florida, 1926; M.S., Florida, 1926; "Farm Management Study of Poultry Farms in Florida." (Cornell, 1935.)

Burton, John E., "Valuation of Vacant Land in Suburban Areas." (Northwestern, 1934.)

Cady, E. L.—B.S., Missouri, 1921; M.S., Iowa State, 1923; "Development of Direct Marketing of Hogs in Iowa." (Iowa State, 1933.)

Chao, Tsai P.—B.S., Central University of China, 1926; M.S., Cornell, 1932; "A Statistical Analysis of Crop Yields in 12 Provinces in China." (Cornell, 1933.)

Clayton, C. F.—B.A., Missouri, 1915; M.S., Missouri, 1916; "The Theory and Methods of Rural Land Use Planning in the United States." (Minnesota, 1934.)

Cunningham, Lowell C.—B.S., Illinois, 1926; M.S., Illinois, 1927; "Factors Affecting Costs and Returns in Producing Milk in New York State 1930-1931." (Cornell, 1934.)

Daggitt, Edmund—B.S., Minnesota, 1921; M.A., Minnesota, 1923; "Studies in the Forecasting of Prices of Certain Agricultural Commodities with Special Consideration of Cotton, Wheat, and Corn." (Minnesota, 1934.)

Denny, Byron C.—B.S., Pennsylvania State, 1930; M.S., Rutgers, 1931; "Changing Transportation Methods and the Distribution of Farm Products." (Wisconsin, 1934.)

Dowell, Austin A.—B.S.A., Iowa State, 1915; M.S., Minnesota, 1925; "An Evaluation

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The Third International Conference of Agricultural Economists

Will be held at Bad Eilsen, South Hanover, Germany, August 21 to 28, inc.

Bad Eilsen is delightfully situated among richly-wooded surroundings in the valley of the Weser, close to the Porta Westfalica.

Hotel Accommodations

Hotel accommodations range from RM. 5.50 to 13.50 per day. These rates are for room, board and gratuities. An additional charge of 1 RM per day will be made to cover Conference expenses. There are facilities for tennis, golf, and other recreations.

Tours

Two fourteen-day excursions by motor-coach are planned in connection with the Conference. Each journey covers a distance of from 950-1,250 miles. The cost is approximated at RM. 300, which will be reduced if a goodly number participate.

Tour A: Eastern Germany, August 5-19. This trip is through Holstein, Pomerania and the Polish Corridor to East Prussia. Grain and livestock farming predominate. Magnificent scenery. It is a region of large (Rittergüter) holdings.

Tour B: Western and Southern Germany, August 28-September 11. Organized principally for Members who are interested in dairying, horticulture, forestry, and the tobacco and hop industries. It includes the Black Forest and the Rhine country.

Several shorter tours will take place in the neighborhood of Bad Eilsen during the week of the Conference.

Those planning to attend or desiring further details regarding this Conference should address one of the following:

H. C. M. Case, University of Illinois, Urbana, Illinois
Asher Hobson, University of Wisconsin, Madison, Wisconsin
C. E. Ladd, Cornell University, Ithaca, New York
G. F. Warren, Cornell University, Ithaca, New York

See page 216 of the January number of the JOURNAL OF FARM ECONOMICS for the Conference Program.